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AVIATION AND COSMONAUTICS

No 4, April 1988

Manned Cosmonautics: Results and Prospects

91440070a Moscow AVIATSIYA I KOSMONAVTIKA in Russian
No 4, Apr 88 (signed to press 5 Mar 88) pp 1-3

[Article by Lt Gen Avn V. Shatalov, twice-awarded Hero of the Soviet Union, USSR Pilot-Cosmonaut]

[Text] To personnel of the Cosmonaut Training Center imeni Yu. A. Gagarin, the past year was one of hard work and a new approach to thinking about present accomplishments and about restructuring the efforts to implement plans. This was made possible by continual improvements in the center's organizational structure and its training base. We have created a system of trainers allowing for collective use of resources that simulate the outside visual situation, all systems of the orbiting station, the transport craft and the computers. Essentially the same resources can be used over and over again in the training complex to successively carry out different tasks, thus producing a significant economic impact.

The work places aboard the station and in the module—there are dozens of them—are now much more highly saturated with instruments and equipment than for example aboard the spacecraft Vostok, Voskhod and even Soyuz. Consequently it takes more resources and effort to train the cosmonauts, the volume of the training program is greater, the time required to carry it out is longer, and a larger number of scientific organizations must participate. The essence of our restructuring effort is to make more reasonable, sensible use of the equipment created for us, including at the center.

It is way back in the stage of rough design of new spacecraft that we must clearly understand what sort of technical resources would be capable of effectively supporting cosmonaut training and operation of real equipment. Examples might include space vehicles which would allow a cosmonaut to work away from the station and in the absence of direct contact with it. When it comes to repairing satellites, a space "bicycle" or "motorcycle" will make it possible to drive up to a satellite to remove faulty units. This kind of work is planned for the future, but the corresponding trainers are needed right now.

The Mir permanent orbiting complex began functioning with rotating crews last year. It is capable of supporting effective work by both Soviet and foreign cosmonauts within the framework of peaceful cooperation. This complex includes the basic unit, the Kvant module, and a system of manned and unmanned spacecraft that could deliver various cargoes to orbit as necessary. It was aboard this complex that Yuriy Romanenko completed his flight of unprecedented duration. All of this became one of the accomplishments of world cosmonautics and mankind as a whole on the 70th anniversary of Great October and the 30th anniversary of the launching of the first satellite.

USSR Minister of Defense Army General D. T. Yazov had high praise for the flight by Yu. Romanenko's crew. He emphasized that the heroism of the cosmonauts is an example of courageous and selfless performance of duty to the motherland to all personnel of the armed forces. Pilots reckon their experience in flying hours. Yuriy Romanenko spent over 10,000 hours in space in the course of three flights. The will, purposefulness and heroism he displayed in the performance of his assignment are typical qualities of Soviet military pilots.

It is difficult in a small article to thoroughly discuss the entire volume of scientific experiments in detail, all the more so because this issue is regularly illuminated in the press. Scientists have received enough information to ponder. I would like to dwell on some items of a general kind which in my opinion deserve attention.

It must be noted that the docking of Kvant and Mir was delayed because of some miscalculations. Luckily the control system was so flexible and the experience of the ground services and the crew was so extensive that the situation could be dealt with honorably and the difficulties could be overcome.

The record flight provided much food for thought. For the first time in the entire history of Soviet manned cosmonautics we received information that will make it possible to change both the procedures of future cosmonaut training and the design of tomorrow's spacecraft, and chiefly those that will fly to Mars. I am certain that the flights about which F. Tsander dreamed will become a reality, and they will be international. If detente proceeds further and if we are successful in persuading our opponents to make reasonable use of the potential that has been created for exploring and exploiting outer space, such a program will not be something out of sight.

Today, one of the main problems in preparing manned expeditions to the planets is crew life support. While we take pride in the results attained thus far, it must be said that prior to Yu. Romanenko's flight we were far from solving this problem. The cosmonauts found their return to earth gravity to be a very difficult thing to endure; their activity was low, they tired very quickly, and the period of readaptation was long. All of this cast doubt upon the very idea of organizing a flight to Mars.

We had an interesting and relaxed discussion of this issue in October of last year at Cosmonaut House. Around 300 specialists and 45 Soviet and foreign cosmonauts attending the celebration of the 30th anniversary of the launching of the first satellite took part in it. There was one question on the agenda: "In what conditions do you think a flight to Mars should be carried out—in weightlessness or in the presence of artificial gravity?"

Many have thought back since K. E. Tsiolkovskiy's day that flying for such a long time in weightlessness was impossible. But all but three of the cosmonauts voted precisely for such a flight. The explanation is simple: They were familiar with weightlessness, but the problem of creating artificial gravity was so complex that its solution is still beyond grasp. As far as the specialists and doctors who kept the cosmonauts under observation after they returned from lengthy flights and who were aware of their physical condition are concerned, they voted in favor of creating artificial gravity.

What did Yuriy Romanenko's flight reveal in this regard? The time the cosmonaut spent in flight was almost enough to reach Mars. But would a return flight following a week's stay in orbit or on the planet's surface be possible? Future experiments may provide an answer to this question.

Looking back on the road that has been traveled, we must admit that for practical purposes none of the cosmonauts ever completed the full physical fitness program. Interruptions were always motivated by substantial reasons: the abundance of experiments, preventive maintenance of the equipment, time spent with visiting expeditions. As a result the effectiveness of measures which would appear to have been fully thought out, measures which had been recommended and adopted as golden rules, turned out to be low. Despite all of our remarks and reproaches, the cosmonauts felt that they were going about things more or less properly, but when it came to assessing their own health, they let things slip. Hence the faith of the cosmonauts in the effectiveness of these preventive resources was insufficient. They realized that there was benefit to them, that the more physical training, the better, but they harbored little hope of returning to earth in good form, in the full sense of the term.

Romanenko decided to test out the procedure to the end, utilizing all of the recommended resources, with absolutely no deviations. It was not easy to gather the strength of will for almost an entire year, but he measured up to the task, and he was able to endure. Nothing could distract Yuriy from the physical training plan. He often had his differences with the flight control center, and he was often reproached because the crew had not done something it was supposed to do. But Romanenko stood his ground, replying: "Tell me what you want me to do, and I'll do it, but right now it's physical training time." He displayed exceptional will, purposefulness and self-control.

When he declared at the end of the flight: "In a couple of days I'll get up and walk on my own two feet," we smiled. Many ventured to say in this regard: He can think anything he wants, but we know how it's going to be! But Romanenko turned out to be right in the end. Television documented him walking down the ramp from the airplane at the cosmodrome on his own, embracing his wife and taking his son up into his arms. Everyone was dumbstruck, even I: What was he doing, what if he toppled over with his son! When on the second day I asked the doctors how Romanenko was feeling, they replied that he was already up, and that he had taken a 500 meter stroll to the river and returned. As it turns out, it is all within the power of the individual, it all depends on his will, on persistence, on maintaining the schedule. There were no special secrets here.

This highly valuable information will promote further development of manned cosmonautics not only in our country but in the entire world. In the future we will need to concern ourselves more with living quarters, with an exercise room, with multiple redundancy of physical training resources in space, and with instilling a sense of confidence in the cosmonauts in the reliability of the tested procedures and in the sufficiency of the arsenal of resources by which to maintain the necessary performance in flight.

The flight of the Soviet-Syrian crew has become an important landmark in international relations. It confirmed the friendship between our peoples, and the capability of scientific organizations and specialists at the training center to prepare and carry out such joint projects. A full schedule of experiments was a typical feature of this flight. And this was natural. On one hand a certain amount of experience had been accumulated in international cooperation, while on the other hand the instruments and equipment had become more sophisticated, and their quality was better, making it possible to train the crews and to carry out the work in space better. On the whole, the flight preparations and the flight itself were successful, and the Syrian side was pleased with the results.

The end of the year was marked by another noteworthy event. During the flight of the Mir station, the crew consisting of Yu. Romanenko and A. Aleksandrov were relieved of their watch in orbit by the crew consisting of V. Titov and M. Manarov. This made it possible to economize on time and forego the traditional chores of packing up and then unpacking the apparatus and returning the station to life. In the opinion of the cosmonauts this is a period in which the largest possible number of experiments requiring the work of two crews should be planned. In such a situation the crews could get hands-on experience with the work procedures, with the design of the apparatus and with the features of its operation in space. No matter how well cosmonauts prepare themselves on earth, new techniques and skills evolve in orbit, and the possibility for making practical use of them under the supervision of a crew that had flown almost a year instills confidence and makes it possible to shorten the path to effective use of the apparatus.

Two Soviet-Bulgarian and two Soviet-French crews are now being prepared for repeat flights.

While the opinion might have been ventured earlier that the space flights were pursuing political goals, this could not be said for the repeat flights. Moreover, now that

time has passed and the enthusiasm associated with appearance of the first cosmonaut has abated, the maiden flights of these states have taken on a new meaning as well.

Bulgarian scientists have achieved some success in creating apparatus, and they have displayed considerable interest in space research. A. Aleksandrov, G. Ivanov's former back-up man, is a graphical example of this. He finished his graduate studies, defended his candidate dissertation, and he is now the author or coauthor of some of the scientific experiments in the Shipka program. The possibility is not excluded that he will be the main cosmonaut in the forthcoming 10-day flight by the Soviet-Bulgarian crew.

The flight program of the second Soviet-French crew is highly saturated with scientific experiments, and it will last a month. There are plans for an EVA, inasmuch as the French side, which is on the threshold of creating the first European orbiting station and its own manned spacecraft, the Hermes, wished to carry out the experiment aboard the Mir complex. It foresees deploying large structures with cosmonauts of both countries participating. The plan is to deliver scientific apparatus created by Soviet and French scientists prior to the launch of the Soviet-French crew.

A flight by a Soviet-Afghan crew will be held this year in accordance with an agreement between the Soviet Union and Afghanistan. The candidates for this flight have begun training at the Cosmonaut Training Center imeni Yu. A. Gagarin.

People sometimes ask whether or not we are devoting too much attention to space. I think that the entire answer lies in the comparison. As of 4 October 1987—that is, on the 30th anniversary of the launching of the first satellite, there were around 1,700 spacecraft in orbit, of which 337 are still functioning. In this case 146 belong to the USSR, 129 belong to the USA, and the rest belong to 13 different countries. These figures tell us that the USA and its allies are devoting no less attention to space than we are. In the future they plan to jointly create an orbiting station. Other countries are proceeding along the same path as well. Japan and China plan to have their own manned resources. All of this confirms the importance of space research to mankind's future.

The path chosen by the Communist Party and the Soviet government has given our country the lead in launching the first satellite, the first craft, manned by Yu. Gagarin, and the first orbiting complexes, and we are proud of this. I am certain that what K. E. Tsiolkovskiy said will come true: Space will provide mankind with mountains of bread and infinite power. Not the kind of power the USA sees in SDI, but real power, in the noble sense of the word.

11004

Aircraft Grounded Due to Careless Maintenance

91440070b Moscow AVIATSIYA I KOSMONAVTIKA in Russian
No 4, Apr 88 (signed to press 5 Mar 88) pp 4-5

[Article by Sr Lt Ye. Khlobustov, master of combat qualification: According to Armed Forces Discipline, "Scratched from the Planning Table"]

[Text] Captain I. Potapov lifted his airplane into the sky. He was to perform a combat exercise. The aviator attached special significance to the flight: It was a serious examination that would wrap up another phase of improving his flying skills.

Having completed his assignment, Captain Potapov came around for his landing approach. He maintained his velocity and glide path precisely; he had but to touch down precisely, and it would all be over. But then something unexpected occurred. When he eased up on the joy stick, the elevator trimming tab did not respond. The pilot reported the incident to the officer in charge of flying, after which he made a forced landing in response to the former's instructions and taxied the airplane to the parking apron. And the planning table was lined out opposite the airplane's number: A back-up warplane went to take its place.

It was not hard for specialists of the air force engineer service to establish the real cause of the near-accident: loosening of the elevator trimmer cable, owing to which the cable caught against the frame. The culprits were named as well—aircraft technician Senior Lieutenant O. Yartsev, who did not check the cable tension very well, and flight technical maintenance unit chief Captain S. Frolov, who failed to supervise the actions of his subordinate. Strict measures were taken against these officers and others involved in the incident. Captain Frolov and Senior Lieutenant Yartsev were relieved of their posts. Major N. Ananyev, the squadron deputy commander for the air force engineer service, was punished.

Let us try to analyze why the near-accident occurred at the fault of these rather experienced specialists, and why the rhythm of the flight shift was disturbed to a certain degree. Unfortunately some aviators feel that a certain amount of risk goes along with flying: Although modern aviation equipment is reliable, no one is ensured against surprises, or so they say. This is the argument which was offered by the persons to blame for the near-accident in their defense. In fact, however, the actual condition of the aviation equipment was not to blame for the fault. It arose exclusively due to the laxity of persons who violated the established rules of maintaining and operating the equipment.

Calling a spade a spade, we would have to admit that elementary carelessness was what let the aviation specialists down. Here is what happened. Competent specialists established that the airplane serviced by Senior Lieutenant Yartsev had performed many sorties with a

loosened cable before the hidden cause of accident made itself known. The aircraft techician and the chief of the flight's technical maintenance unit were chiefly to blame for this. On several occasions they permitted "minor" deviations and ignored the requirements of the documents regulating accident-free flying, even though they were well aware that the corresponding persons are obligated to check the cable prior to each sortie.

Analysis of activities of personnel of the air force engineer service headed by Major N. Ananyev showed that not all aviators carried out their responsibilities conscientiously, and that their immediate supervisors condoned such behavior. Some officers do not have an entirely accurate idea of the importance of following the book. For example some feel that strictness could damage relationships with subordinates. This is why they sometimes act indecisively. Rather than demanding accurate and unquestioning fulfillment of the provisions spelled out in the manuals and guidelines regulating accident-free flying, they structure their mutual relationships with subordinates on the basis of persuasion.

"Urging and admonishing," M. V. Frunze asserted, "are by their essense the grossest violations of discipline." I think that this premise is especially valid in aviation. Experience convinces us that the cause of any problem or unpleasantness, no matter what it is, should be sought in violations of orders, instructions and manuals. There could be no doubt that tolerance of deviations from the requirements of the manuals and documents can lead to one thing only—gross violations of flying regulations, together with all ensuing consequences.

It must be emphasized that carelessness sometimes comes about deliberately. Consider for example a specialist who works unsystematically, who is easily distracted, and who deviates from the aircraft inspection procedure when servicing aviation equipment. There is an unwritten law in aviation that as soon as an operation is completed, its completion must be reported to the senior supervisor. Sometimes when this rule is not observed, very simple jobs are not carried out as they should be, and unpleasantness results.

For example a fuel leak from the right tank group was discovered on an aircraft serviced by Lieutenant I. Volodin, a young aircraft technician. The pilot was instructed to taxi to the parking apron. An inspection revealed that the filling spout of one of the containers had not been firmly shut after refueling. Aircraft mechanic Warrant Officer Yu. Krotov, who did his job carelessly, did not report to the officer that the aircraft had been refueled, while the latter, who trusted his subordinate, failed to check his work, even though he was obligated to do so. The irresponsibility of the specialists could have meant a fire aboard the airplane.

Such cases persuasively show how important it is to strictly follow the work procedures, observe the requirement of checking each operation, maintain maximum vigilance, and carry out the provisions of the guidelines and the instructions and directives of supervisors unquestioningly and precisely.

High discipline, diligence and truthfulness are the main things flying demands of specialists of the air force engineer service. No surprises and miscalculations of any kind ever arise in the operation of complex equipment when the aircraft technician, the flight's technical maintenance unit chief and the service or maintenance group stick to their principles and do their work precisely. Responsibility for assigned work, accurate fulfillment of the provisions of the guidelines and strict observance of regulations help them prevent near-accidents and promptly reveal concealed defects.

During preflight preparations, Senior Lieutenant V. Komarov, the flight's technical maintenance unit chief, decided to inspect the engine systems after aircraft technician Senior Lieutenant N. Turukin reported that he had finished his work. Carefully inspecting the propulsion unit, the top-class specialist discovered a flaw: The parts securing the combustion chamber housing to the engine nozzle were loose. As was required, the officer immediately reported this up the chain of command. The senior supervisor grounded the airplane. The pilot took off on his assignment aboard a back-up aircraft.

In this case the aircraft was scratched from the planning table owing to the responsibleness and technical vigilance of the aircraft specialist, and owing to this desire to follow the guidelines precisely. As a result not only was a dangerous situation averted, but also in-flight failures of other aircraft were dependably prevented in time. The fact is that inspections conducted soon after on the aviation equipment revealed similar flaws in another two of the subunit's airplanes.

Most of our officers are like Senior Lieutenant V. Komarov. Here is one of the chief pledges each of them took in the socialist competition under the slogan "Selfless military labor, exemplary service and the highest discipline—our contribution to the motherland's defense": "No flying accidents and near-accidents on my account." The leading officers believe that fulfillment of this pledge would require following the book in things large and small, competently combining exactingness with the professional skill of each individual, and constantly and unfailingly raising exactingness in all units of the air force engineer service.

Diligence and obedience are the soul of military service. No one should ever forget this time-tested army saying.

11004

Looking Ahead to the 19th All-Union Party Conference: Positive Training Experience Needs to be Publicized

91440070c Moscow AVIATSIYA I KOSMONAVTIKA in Russian
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[Article by Col A. Dmitrichenkov and Lt Col N. Antonov: "Effectiveness of Progessive Experience"]

[Text] Extensive introduction of restructuring experience into practice is an important factor that would hasten completion of the tasks facing aviators. Competing under the slogan "Selfless military labor, exemplary service and highest discipline—our contribution to the motherland's defense," many military collectives are creatively approaching fulfillment of their pledges, and confidently traveling the road of further improvement of combat skills.

What valuable things are there in today's progressive experience? In what ways are the units and subunits activating the human factor? How are the creative potentials of aviators being realized in socialist competition? The traveling editorial board of the journal AVIATSIYA I KOSMONAVTIKA studied these questions in the Red Banner Guards Long-Range Bomber Air Regiment commanded by Guards Lieutenant Colonel V. Yakunov.

Seeing the Main Link

During the Great Patriotic War the Guards Long-Range Bomber Air Regiment traveled a glorious combat road and earned an honorary title. Its pennant bears a combat order. Nineteen aviators have been awarded the Hero of the Soviet Union title, and two of them received this highest distinction of the motherland twice.

The traditions of the frontline veterans live on and develop. The personnel are successfully assimilating the menacing combat equipment and carrying out important missions. An overwhelming number of aviators are specialists of a high class.

Last year the Guards attained good results in combat and political training, and they performed well in the basic forms of combat use. In the course of intense tactical flying exercises they demonstrated higher aerial skills, tactical and fire proficiency, knowledge and ability to act in a complex situation. The number of inflight near-accidents for which personnel were responsible decreased in the regiment.

Acquainting ourselves with the state of affairs in the unit, we can say that restructuring is occurring in the thinking and the psychology of the people. It is manifesting itself in their attitudes toward their responsibilities, and in the fight to attain a high level of combat readiness, discipline and organization. This process is putting increasingly larger unutilized reserves into action, it is affecting all areas of the lives of the military collectives, and it is influencing the consciousness of each serviceman more tangibly. Socialist competition is improving and growing more active; its most valuable benefits include achieving high results, accumulating progressive experience and developing innovative work techniques and methods.

For example the number of inflight near-accidents at the fault of personnel decreased significantly in the squadron under the command of Guards Lieutenant Colonel I. Vyrtsev. Recently the combat readiness of the detachments and the fire and tactical skills of the crews improved noticeably. Last year and this year the personnel took part in tactical flying exercises involving combat use. In the course of all combat training missions the aviators demonstrated high discipline and organization. This was promoted in many ways by socialist competition.

The squadron commander is one of the unit's experienced pilots, commanders and indoctrinators. Relying upon the assistance of his deputies and the party and Komsomol organizations, Guards Lieutenant Colonel I. Vyrtsev managed to channel the mobilizing power of competition into raising the quality of every assignment. When summarizing the results, the detachment commanders and group chiefs objectively assessed the contribution made by each aviator to the common cause.

The party organization is also growing more active under the leadership of its secretary, Guards Captain A. Zhukov. Analyzing the results of the past year, the communists came to the conclusion that had the problems of competition, and particularly of generalizing and disseminating progressive experience, been within the zone of their attention more often, some of the indicators could have been higher.

At the beginning of the winter training period the squadron conducted a party meeting in which the question as to the personal responsibility of communists in attaining the objectives of raising the subunits' vigilance and combat readiness was raised. Comrades A. Narozhnyy, Yu. Bykov and V. Brovkin, who relaxed the demands they put upon themselves, were subjected to valid criticism. Those who set the example in service were discussed as well: N. Proistin, N. Sheludyakov, S. Kirilov and M. Gribov. The idea that restructuring competition means deepening its democratic roots and expanding the possibilities for lively creativity by the personnel and for displaying initiative was a recurring theme of all speeches.

But the matter was not put to rest after the meeting. On the initiative of the party buro the experience of the best specialists—N. Proistin, V. Kuznetsov and others—was generalized, shortcomings were analyzed, and the things that were making it difficult to increase the combat proficiency of certain aviators in the squadron were revealed. In this connection the communists criticized the detachment party organization secretary, Guards Captain S. Smirnov, for weak work with party group organizers, who sometimes look the other way when certain comrades fail to observe

party principles and when competition is organized in formal terms only. The criticism played a positive role. The collective began to evaluate the results of military labor more strictly, and to conduct regular exchange of work experience category by category.

The fresh winds of change also blew over other collectives. For example simplifications and formalism were permitted before in the preparation of ammunition and armament in the subunit in which Guards Major P. Botvinkin is the commander and Guards Senior Lieutenant L. Golub is the party buro secretary. This turned the people off and generated indifference and apathy. The command and the party committee failed to delve deeply into the subunit's affairs, satisfying themselves with inflated indicators and cheerful reports. But under the party organization's influence a turning point occurred. The communists boldly opened up shortcomings to public scrutiny and revealed the causes behind them. There were some who were not happy about this. There were some, after all, who found such window dressing, the peaceful life and unearned honors to their liking.

Nonetheless the overwhelming majority of the people supported the positive changes. The principles of socialist justice confirmed themselves in the collective. The labor of each individual began to be evaluated more objectively, attention is now devoted to disseminating the experience of the best specialists, and criticism of the laggards has become louder.

In general the mechanism of inhibition has been smashed, and the moral atmosphere in the subunit has grown healthier. This has also had an effect on the results of combat work. The personnel once again captured the lead in the socialist competition, but this time it was fully deserved.

Here is another example that attests to the restructuring occurring in the consciousness of the people and to their new way of thinking. As was mentioned above, high-class specialists are the rule in the unit. A modern training base and tested procedures are available for their training needs. It would seem that no special problems should arise in this area. But during a certain party meeting in the technical maintenance unit, during which the progress of professional training was analyzed and plans were made for its future, the communists openly expressed their dissatisfaction with the way training was organized.

The problem is that it was being conducted for all specialists of the unit's air force engineer service. But the kind of work that aviators of the technical maintenance unit did posed questions to them requiring deeper examination, more-concrete and diversified knowledge, and study of the experience of the best workers in this field.

The people were able to clearly envision what was needed, and they offered a substantiated proposal for changing the special training procedures. Under Communist I. Vaskin the party buro supported the proposal. This initiative was thoroughly examined by the unit command and the party committee. The regiment deputy commander for the air force engineer service addressed the party committee at its regular meeting. And it must be said that the communist executives recognized the merits of the innovative proposal.

Following its adoption a heavy burden fell upon the shoulders of Guards Lieutenant Colonel V. Baranov and the regiment's engineers in the various specialties. Had they been reluctant to work in the new way, the useful initiative might have suffocated in the death-grip of mistrust and bureaucracy. This did not happen. And now the regiment has activated an extremely solid reserve for upgrading the quality of professional training of specialists in the air force engineer service. And without any material outlays and staff changes at that.

In an interview with us, regiment deputy commander for political affairs Guards Lieutenant Colonel V. Podtykalov noted that there were many such examples of the initiative of military collectives, party organizations and individual communists. Take for example active party members V. Tutov, S. Smirnov, A. Kravtsov and others, who were avid proponents and initiators of improvements in the forms of political training. They came face to face with a problem as well: Should they forego the established rules, seek something new, and experiment on the basis of practical experience, or should they remain as before, should they "not make waves," so to speak.

"Our choice was predetermined by the general mood of most of the aviators and by the political and moral atmosphere in which we live," said Valeriy Dmitriyevich. The people reject formalism in all of its manifestations, especially in ideological work. And so we reassessed the forms and resources of ideological work from the standpoint of its purposefulness and effectiveness. As an example we now conduct fewer general functions involving all of the officers and all of the warrant officers. Instead we are devoting much attention to group lessons, utilizing the "narration-discussion" method and the problem-posing method, and we conduct a dialogue. What have we achieved? We have raised the interest of the students, and we have made the group leaders work harder, delve more deeply into the affairs of the collectives and study the people better. Both inspections and the general course of events in most of our military collectives show that the theoretical knowledge of the aviators is transforming more and more into their internal convictions.

And so we witnessed the rudiments of a new attitude toward the work, examples of restructuring the thinking of individual communists and of the activity of entire collectives and party organizations. This ability and capability of CPSU members and party organizations for

solving the problems facing them today is associated with the activities of the party committee under the command of Guards Major V. Guzevat. He injected life into his work, he embarked upon the road of expanding party democracy and glasnost, and he increased his demands upon CPSU members for the work entrusted to them and for the end results of combat training.

The party committee is staffed chiefly by energetic, authoritative people who know how to get things done. Included among them are officers V. Baranov, V. Yevstigneyev, V. Sadovnikov, V. Yakunov and others. Having communist executives report on their efforts to tighten military discipline and increase the effectiveness of the training process, personal participation in the indoctrination of aviators and the organization of socialist competition has become a regular practice.

Contact exists between the commander, the staff and the party committee. On the whole, it is evident that all communists are now setting the tone, they are more apt to be the model of a contemporary attitude toward the work. Here is a typical example.

Until recently it was the rule for persons from the command staff to carry out the most important missions having to do with combat use. It was felt that this was necessary chiefly as a means of training and indoctrinating subordinates. And it was these individuals who normally received the subsequent rewards. But on one occasion when this kind of mission was posed before the personnel, the party committee decided to break with the established stereotype and assign the combat work to the best young crews, consisting of officers V. Dvortsevoy, G. Skopin, Yu. Futyanov, A. Bocharov, Yu. Mogdalev, A. Malkov and others. The command supported this proposal.

The party committee put training of the crews under special scrutiny. Each aviator had logged many tactical sorties, such that the experience was there. But good psychological preparation was also needed for the assignment. The party committee secretary, a military navigator 1st class, met with the crew navigators on several occasions, asked them about their training and offered useful advice. Other members of the party committee worked a great deal with them as well.

The aviators carried out their mission with an outstanding score. The party committee immediately began generalizing and disseminating their work experience. But most importantly, the approach itself to the work was now different. By this example the unit command and party organization demonstrated that every crew had to be ready to fulfill important assignments. Real combat readiness and the highest combat proficiency, displayed as an established norm, are what are expected of Guards aviators, and not showmanship and recommendations for top awards.

The party committee properly assesses the role of the human factor and does everything it can to activate it. The forms it employs are varied: combat glory leaflets, photo newspapers and displays devoted to the work of the best specialists. The radio newspaper "Our Garrison" is broadcast periodically. Its editions discuss the leaders of the socialist competition. The regiment's rich combat traditions are capitalized on as well. In particular, sorties flown in honor of the crew of the unit's war hero, exchange of experiences in present-day combat training with the experiences of wartime training, and so on. In a word, there are many useful and instructive things in the party committee's activities.

In addition, following a report by the party committee on the course of restructuring, the party meeting critically analyzed what had been done, defined the unsolved problems and planned some of the ways to raise party influence on the quality of combat and political training and to intensify organizational and ideological-political work.

The party committee constantly monitors the course of combat training. As an example the state of affairs in the subunit in which Officer V. Zadnepryanyy serves was discussed on several occasions at its meetings. Shortcomings in organizing the training and indoctrination of subordinates were pointed out to the communist executive, and he was asked to correct them by a specified deadline. But the desired changes have not yet come about. Why? Analysis shows that the party committee had been unable to raise the effectiveness of the subunit's party organizations, and it had not reinforced its decisions organizationally. And this is not an isolated example.

But here is the other side of the coin. The detachment commanded by Guards Major I. Shchedrin was declared to be one of the best on the basis of competition results, even though it had suffered many shortcomings earlier. What was it that put the detachment out in the lead? Finding the answer to this question was not an easy thing to do. But it became clear after talking with many people that the party organization, which is led by Guards Captain Yu. Osipov, played a large role in this. Comradely criticism and analysis of mistakes break down psychological stagnation and compel people to evaluate their deeds and acts more demandingly.

Such diametrically opposite examples obviously could have played a major educational role and reinforced social justice, had the party committee analyzed them and made the public aware of them.

Incidentally, glasnost is clearly lacking when it comes to disseminating the work experience of both the best party groups and party organizations, and individual communists. The generalized experience accumulated in indoctrination by aircraft commander Guards Captain B. Tsybenko and the experience of political lesson group leader Guards Senior Lieutenant S. Shangin deserve attention. They really have some things to teach us. This is recognized by their commanders and fellow workers.

Most members of the party committee have the same opinion as well. And yet in one of its meetings the party committee thought it necessary to debate the question as to how to disseminate progressive experience. It seems to me that the answer is obvious: concretely, clearly, in a business-like way, without rhetoric.

It was no accident that I began my discussion of Guards aviators and their affairs with examples from restructuring entire military collectives and party organizations. They have made headway in some things, and not yet in others. But what is important is that the process is under way, it is gathering strength. This is precisely what characterizes the new stage of restructuring in the entire country. And in the Guards unit named above, the party organizations have progressed from talking about what to do and how to do it to doing it. This is precisely the approach to the effort encouraged by the February (1988) CPSU Central Committee Plenum. The act of taking this important step, it seems to me, should be the top concern of the party committee today. After all, it bears great responsibility for recognizing the shoots of innovation, helping them rise and grow strong, and turning the attention of others to them. This valuable experience needs dissemination, and not fixation.

The payoff from new methods and approaches, from new viewpoints and assessments, from higher responsibility, discipline and wide glasnost will doubtlessly manifest itself in the work. Preparations for the 19th All-Union CPSU Conference are also a major motivating factor here. The next step taken by the Guards aviators in improving combat readiness and raising vigilance and organization may become the concrete result.

New Approaches Are Needed

Things were buzzing at the command dispatching point: This was the first time this year the entire regiment was to fly. Lieutenant Colonel Yu. Bushuyev, the officer in charge of flying, was deeply into it, speaking crisply as he gave out his orders. Command dispatching point navigator Guards Senior Lieutenant I. Kurbatov, landing zone officer Guards Captain N. Grishin and other specialists were working with the same intensity.

"One-Four-Nine, take off!"

Breaking away from the landing strip, the multiton missile carrier soared up into the sky. The shafts of roaring flame and the white smoke trail could be easily seen through the windows of the command dispatching point.

"The commander's taken off!," an officer standing nearby said proudly, and he added: "He's always first here! That's the tradition."

Traditions.... The regiment is rich with them. One might say they are the foundation that supports the combat training and the life of all of the personnel. Inheriting and developing these traditions, the military aviators are marching forward, attaining new successes in military labor.

Traditions associated with aviator training and with flight safety are held in especially high esteem in the regiment. We were given examples and facts to confirm this. In particular a trend toward higher proficiency and toward a lower frequency of inflight near-accidents has been noticed. What has happened was a natural consequence of a well- tuned training process, of harder educational work with people.

What changes have occurred in the combat training of the aviators? Guards Lieutenant Colonel A. Zatsepin, regiment deputy commander for flight training, said:

"We have no right to become satisfied with present accomplishments, and therefore we are seeking ways to intensify combat training, and we are trying to raise a barrier against stereotypy and simplification. It is now harder and more honorable to receive a score of four for combat use than it was to get a score of five before. The fact is that in former times we often flew just for the sake of the grades alone. We did not give much thought to what such flying gives to a pilot, whether the aviator gains anything in occupational proficiency after each flight shift. Now we are waging a decisive struggle against laxity and simplifications in combat training. This did of course add to the troubles and the problems."

Launching missiles is a complex and important job. Preparing for such combat use, the regiment took a differentiated approach to selecting the crews, following the principle that the effort should increase combat proficiency. Besides experienced crew commanders such as Guards Major V. Dvortsev and Captain Yu. Mogdalev, who had already been credited with three launchings, Guards Captain Yu. Futyanov's crew, which did not yet have sufficient experience, took off on the special assignment.

The preparations were made in plenty of time. The flying assignment was carefully studied, and thought was given to the actions they would take in the event of change in the aerial situation, to the means of surmounting air defenses, to maximum utilization of the maneuvering capabilities of the airplanes, to guiding them to the target precisely, and to safety measures. Navigators Guards captains G. Skopin, A. Malkov and A. Bocharov labored together with the crew commanders with enviable diligence. After all, the sorties were to be conducted at the maximum tactical radius of the airplanes, in adverse weather.

"Watch and learn! Now that's a picture-perfect take-off!" delightfully exclaimed one of the squadron commanders to his subordinates when three of the missile carriers climbed in the air and, gaining altitude steeply, disappeared into the clouds. "These pilots won't let you down!"

Confidence in success was justified. The crews fulfilled their mission with an outstanding score. What made this

possible? The answer is clear: reliance upon progressive experience. Upon experience preserved in the regiment from prior years.

Thus in preparing to launch their missiles the crew commanders made use of everything valuable they had learned from others in their unit such as Guards majors N. Sheludyakov, N. Proistin, V. Sadovnikov and others. Navigators adopted for themselves a specific procedure developed by Guards Major D. Kiosya for practice missile launchings, and they gleaned from his experience the steps taken with missile armament during practice launchings. In addition they had an excellent understanding of the physical essence of all processes occurring in the airplane-missile system. Guards Captain A. Kuzin's experience with the procedures of assuming the target run and making sensible use of aircraft navigation resources came in handy as well. The aviators strictly adhered to the provisions spelled out in a memo on what to do in unusual situations while on the target run and when working with missile armament.

This example shows how important it is to discern the signs of progressive experience, and to know how to conceptualize them and make them available to all pilots and all personnel. The regiment was able to awaken the aggressiveness of the best pilots, navigators and air force engineer service specialists at the critical moment. And this in turn made it possible to impart a new impetus to upgrading the quality of flying assignments and to ensuring their safety.

Reinforcing creativity and doing everything to develop initiative in generalizing and introducing the experience of the leaders in training is one of the most important directions of restructuring. In principle the collective should act this way all the time, and not just in certain phases of combat training. But experience shows that in a number of cases the attitude in the regiment toward progressive experience frequently turns from hot to cold, and the shades of formalism and conventionalism are clear to see.

The moment we brought up the role of progressive experience in ensuring accident-free flying for discussion, not only Guards Lieutenant Colonel A. Zatsepin, who incidentally is relatively new in the regiment, but also most of the old-guard executive officers became clearly confused. They were forced to admit that there was no such experience!

Yes, the situation takes on the characteristics of a paradox. The regiment has progressive specialists, people whose activities deserve persistent attention, but for some reason their methods are not always put to use. Cases of outright disrespect of progressive experience are encountered as well.

As an example, Guards Lieutenant Colonel V. Yakimenko had served many long years in the unit. Not even the strictest inspection ever produced any complaints about his aerial skills and his technical competency. And when it came to fire and tactical training, Yakimenko could not be touched by anyone else in the regiment. In short, among the aviators this sniper-pilot was a person of note. Viktor Dmitriyevich helped many young fellow servicemen develop their combat proficiency. His advice was heeded, and he was taken as an example. He always put foresight in first place in matters of flight safety. Noticing an undesirable phenomenon coming to fruition in time and quickly implementing the appropriate measures were most important in his work. But then Yakimenko was retired into the reserves. And his sniper's experience left the regiment with him.

"He took it along with him, as a memento," was what we were ironically told.

And yet there was some truth behind this remark. Guards Lieutenant Colonel V. Yakimenko left no worthy successors. A "Leaflet of Glory" was published by the regiment in honor of this officer, and that's all. The command lacked the spirit to do more. As a result valuable experience that still had some life in it was lost.

Once I also heard this opinion from aviators: Introducing experience is not all that hard, if only the experience were there to introduce. Are things really like that? Valuable and instructive things which are perhaps present in every military collective in which people work thoughtfully and creatively do not always lie on the surface. You must know how to find them out. Even the experience of recognized leaders that speaks for itself requires not so much dissemination as persistent implementation.

Yes, before in the regiment they used to do things "the same old way." They composed some lines about somebody's accomplishments, ran them off on a duplicating machine, kept one copy at headquarters for the records, and gave the rest out to the subunits. And that was the end of it.

This work style could not have satisfied anyone. There was little benefit from such generalization and dissemination, if we can call it that. These pieces of paper gather dust on the shelves, and no one cares about them, even if they actually talk about worthy people, about true masters of their affairs. But is their real significance all that great?!

We have seen several such pages of text, carelessly clipped together and carelessly filed. While one of the reports on progressive experience written by Guards Captain G. Skopin discussed navigator ground training based on the structural-logical method and some instructive methods from his own work, another devoted to Guards Captain A. Kuzin had nothing of the sort. Descriptions of other "experience" suffer from generality as well.

The sad thing here is not only that no one studies this experience but also that the creators of the progressive experience themselves—recognized, authoritative specialists—often endure a sense of dissatisfaction and insult from such a relationship to them.

Everyone knows that a person works eagerly when his labor is valued in the collective and when he is given his due. This is especially important when it comes to publicizing progressive experience. But is the regiment considering this? As we see it, conscientious military labor has become a need, the meaning of life and service to most of the regiment's aviators. This is why it is very important to do everything possible to support such a working mood, and to make sure that the human factor would operate at full power, that it would be stimulated morally and materially, and that all of the best of its manifestations would invariably be utilized to make forward progress.

We feel that those officials on whom publicizing the best people depends need to take another look at their views, they need to turn their attention fully to the creators of progressive experience. Members of the regiment's instruction methods council should do this as well.

There are many instructive things in the activities of the regiment's instructor trainers. They have an influence upon the most important issues of political and military indoctrination, aviator combat training and accident-free flying. But even the instruction methods council needs to conduct a creative search. Without it, there could be no success. We need to look into our tomorrows within our areas of competency. In a word, we need to organize the work with an eye on the future, but without detaching ourselves from the present-day concerns of the aviators.

Implementing the experience of the best pilots, navigators and aircraft specialists is one of the important directions of the activities of the instruction methods council's sections. This is one of the topics that should be discussed periodically at their meetings. For the moment, unfortunately, the effectiveness of the instruction methods council's recommendations on this important issue is extremely low.

How can we explain this? Usually by inertia. After all, introduction of things that are new and progressive sometimes requires a break with evolved stereotypes, and turning away from shopworn excuses, such as a lack of time. It is high time for members of the instruction methods council to raise the prestige of progressive experience, to do everything to see that it would dominate in the military labor of aviators, and reflect its true value.

It would seem that the regiment command and its party-political machinery have done a lot in regard to the problem we are discussing. But this time of restructuring requires more. This is why the unit has selected the true course: They are thinking not about their successes but about why some aviators are still satisfied with "mediocre" results in combat training, and why they violate the rules of flying. The question being raised is this: Why is there such a laissez-faire attitude toward generalizing progressive experience in some cases?

Problems that continue to trouble the collective are many in number. Responding to them means critically analyzing and objectively evaluating the real state of affairs in the regiment, and mapping out specific ways to integrally carry out the urgent tasks.

We believe that members of the regiment's instruction methods council should take a more principled position in this area. They could help to speed things up by actively searching for ways to intensify the training process and to bring it closer to the conditions of real combat, and by making stricter demands on those who attempt to carry out the new tasks in the old ways. And it is especially important to intensify attention toward instructor training in those areas where the baggage of old habits continues to dominate. The regiment has all of the reference points and all of the experience deserving of attention to carry all of this out.

11004

In Accordance With Perestroika: DOSAAF Aeroclubs Train Young Pilots

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No 4, Apr 88 (signed to press 5 Mar 88) pp 12-13

[Article by Lt Gen Avn S. Maslov, deputy chairman, USSR DOSAAF Central Committee: "Preparing a Worthy Replacement"]

[Text] "Please advise me how I could best prepare myself for the army," asks Andrey Filatov, a ninth year student from Gorkiy. "I wish to become a pilot...." This request comes up frequently among the many letters received daily by the Directorate of Aviation Training and Aviation Sports of the USSR DOSAAF Central Committee. Reading them, one experiences a sense of satisfaction and pride in the fact that love for aviation is not weakening and that the halo of romanticism and heroism about a military pilot's profession is not fading away from one generation of Soviet youth to another. And on our part, we try to help our young authors in every way we can with our advice and our effort, and we invite them to take the first steps toward their dream in DOSAAF's aeroclubs.

The defense society enjoys extensive possibilities today. Each year over 300,000 young men and women pursue airplane, helicopter, glider, parachute and hang-glider sports and aircraft and rocket modeling, and undergo a school of military-patriotic indoctrination.

Recently, studying experience in organizing training and indoctrination in accordance with the requirements on initial flight training for young people of different ages, I visited aeroclubs in Bryansk, Leningrad, Magnitogorsk, Sverdlovsk and some other Ukrainian cities. The creative initiative, resourcefulness and the thoughtful work with young people assimilating the basics of flying displayed by instructor pilots such as V. Silchenko, A. Fedin, A. Shevchenko and A. Yurchenko left a good impression. They all devote considerable attention to the moral, political and psychological training of their students, they nurture them on the glorious combat traditions of our aviation, and they help them develop the best personality traits of a Soviet citizen—a patriot, internationalist, laborer and warrior. Cadets S. Antonov, A. Yelizarov, O. Mikhaylov, Ye. Oparin, A. Polyakov and A. Ryabov of the Borisoglebsk Higher Military Aviation School for Pilots and cadets V. Zaimov, I. Kucherov and the brothers Streltsov of the Chernigov Higher Military Air Pilots' School are successfully applying the knowledge, experience and lessons of life acquired from their mentors.

Much is being done in the aeroclubs to create a modern training material base. This makes it possible to intensify the training process, and to ensure the effectiveness and safety of the flights of 9th and 10th year students. The training material base of the Vilnius, Kalinin, Leningrad, Odessa, Smolensk and some other aeroclubs corresponds more or less to the higher requirements.

Instructor training work requires a scientific approach, and consideration of the specific features of teaching young people about flying. Significant changes for the better in restructuring the organization and procedures of training are noticeable in the activities of the Sverdlovsk, Magnitogorsk, Bryansk and other aeroclubs. The restructuring effort is based on activating the human factor and on emphasizing an individual approach to the training and the indoctrination of young people.

Thousands of young people are learning how to fly today in the defense society's aeroclubs. Such mass participation was preceded by an experiment conducted in Moscow's 1st and 2d aeroclubs and in the Serpukhov and Kolomna aeroclubs. Its essence was to determine how well children of 15-16 years are able to endure the moral, psychological and physical loads associated with flying and with flight preparations, and the degree of assimilation of theoretical aviation disciplines. The research results were analyzed and generalized not only in our organization but also in the ministries of education and public health. The experiment persuasively demonstrated that DOSAAF aeroclubs can organize fully effective initial flight training for young people of different ages, and carry out occupational selection of young people for admission to higher military pilot schools. This work is presently assuming an increasingly greater scope and pace.

The business and creative ties of our aeroclubs with schools, vocational-technical schools, tekhnikums, VUZes and the collectives of industrial enterprises and kolkhozes have become closer in the course of preparations for the 10th USSR DOSAAF Congress. "Junior Aviator" clubs are being opened in aviation organizations in accordance with a decision of the buro of the presidium of the USSR DOSAAF Central Committee. The defense society's oblast committees have founded 22 children's and young adults' glider schools. Hundreds of parachute sports clubs and sections are now operating.

At the same time the decisions of the 10th USSR DOSAAF Congress obligate us to constantly increase our efforts to prepare young people for the army and the air force well. For example the task of having a sufficient number of children's and young adults' clubs in DOSAAF aviation organizations by the end of the five-year plan has been posed.

But getting the young person interested in aviation and helping him to acquire his first flying skills does not yet mean developing a worthy citizen of our country, an air warrior whose courage and proficiency would be multiplied by the great power of ideological conviction.

Restructuring raises the spiritual values of socialism to a new height. Indoctrination and raising the political and social activity of young people have been elevated to the ranks of the most important general party and state tasks. The role played in these tasks by party, Komsomol and trade union organizations, the school and the family is rising noticeably. The defense society's primary organizations are also making a substantial contribution to the military-patriotic indoctrination of the growing generation. Noting this to be a natural consequence of the positive changes occurring in the country, I would like to say some good things about the soldier-internationalists who have brought a warrior's spirit, a business-like manner, creativity and intolerance of bureaucrats and formalists to the work with preconscript youth.

As an example A. Vlasenko, an engineer of a certain production association who in his time had carried out his military and international duty within the limited contingent of Soviet troops in the Republic of Afghanistan, has been working for several years on the basis of public funding at the Alma-Ata aeroclub as a parachute jumping instructor. Ideological conviction, high professional training (he is a USSR Master of Sports, and he has made around 2,000 parachute jumps), boldness and stubbornness in the struggle with difficulties attract young people to him and make them want to take their mentor as their example. The experienced instructor has trained over 130 high-class parachute sportsmen. There are many enthusiastic trainers of this sort in other aviation organizations as well.

War and labor heroes and veterans of the armed forces and the air forces are doing a great deal of needed work in preparing young people for the army in the "Patriot",

"Preconscript" and "Aviator" youth clubs. The successes of DOSAAF aviation sportsmen are also helping to attract young men and women to aviation. Just last year they broke 42 world and 73 all-union records. World record-holders in airplane sports V. Terskiy and N. Sadovnikov, hang-glider pilot A. Kochar and glider pilot D. Vilne are honorably continuing the glory of the defense society's sportsmen. L. Nemkova and N. Nikityuk have become absolute European champions in higher aerobatics. Masters of parachute and of aircraft and rocket modeling sports are credited with many brilliant victories.

However, the positive changes that have occurred in work with preconscript youth do not at all hide the acute problems requiring solution today. Old approaches and methods are slowing down the restructuring of training and indoctrination in many aeroclubs. Inertia of thinking and action is high. Unity of word and deed and the ability to make the right conclusions from criticism remain just good intentions among some instructors. This is true of instructors of the Vinnitsa, Kaluga and Tbilisi aeroclubs, where stagnant phenomena are especially viable and are having a negative effect on training, indoctrination and flight safety.

Unfortunately our internal difficulties and concerns are sometimes aggravated by interdepartmental disarray.

What comes of it? Cadets are selected and aeroclubs of DOSAAF organizations are staffed with the participation of military commissariats. In this stage of the work with preconscript youth one can still sense some mutual understanding and interest in occupational orientation of the future military aviators. A different picture appears 2 years later, when after undergoing initial flight training young people who wish to become military pilots return to the same military commissariats, and in the best case many of them are sent to combined-arms, construction and any other schools but aviation. Why? Because the workers of military commissariats have their own plans and schedules. This is where friends separate, as they say. Interdepartmental interests and sometimes simple ambition take the upper hand. Today for example, the lowest percentage of candidates for admission to flight schools is found in the military commissariats of the Ural and North Caucasus military districts.

But let us assume that some DOSAAF graduates have been lucky: They have become candidates for admission to training in higher military aviation schools for pilots. Does this mean that their dreams have come true? Not necessarily. Here are some figures from an experiment: Among young people sent at our request by military commissariats to selected schools, 32 percent were admitted to the Borisoglebsk Military Aviation School for Pilots, 31 percent were admitted to Balashov, 26 percent were admitted to Kacha, 33 percent were admitted to Kharkov, 27 percent were admitted to Chernigov, and from 47 to 53 percent were admitted to Orenburg, Syzran, Saratov and Tambov. Many—from 35 percent in Borisoglebsk to 47 percent in Orenburg—were refused admission due to an unfavorable conclusion by local medical commissions. This was even though garrison military medical commissions recognized the candidates fit for training in flight schools literally just prior to this. This is a paradox which unfortunately costs the state no meager expense. Because the aeroclubs do not have their own flight surgeon commissions, the system for selecting candidates for training in schools by military commissariats must be improved and their responsibility for the quality and results of such selection must be raised.

From 25 to 30 percent of the applicants to the Balashov, Kharkov, Chernigov and other schools failed their competitive entrance examinations. This is the fault of not only the young people, who had prepared for the examinations poorly, but I think also of the aeroclub directors and instructors. Considering the current success rate of their students, perhaps they should not have recommended all of them without exception to flight schools, and raised the hopes of the cadets in such a fashion.

I am also troubled by the sizable number of aeroclub graduates who "failed the competition." The fact is that initial flight training acquired by cadets in aeroclubs is not considered, and it provides no advantages to applicants to flight schools. I believe this to be wrong in principle. Absence of a moral stimulus frightens many young people who show promise in flying away from the schools, diminishes the effectiveness of our work and impoverishes the air force. And after all, I am not asking for any special privileges. In my opinion it would be sufficient to extend to aeroclub graduates the advantages presently offered to first-term and extended-service servicemen applying to the VUZes.

The recently conducted 10th USSR DOSAAF Congress thoroughly analyzed the positive experience, the shortcomings and the proposals of participants of the precongress discussion and the delegates, and it worked out and adopted the basic directions of restructuring mass defense work. Deep analysis of urgent problems and their immediate solution should result in fundamental changes in military-patriotic indoctrination and in preparation of young people for service in the armed forces. It stands to reason that this will require new approaches and greater effort, initiative and creativity, and the closest possible interaction between DOSAAF organizations, including aeroclubs, with labor and military collectives. We have common goals and tasks, and we need to work on them together.

11004

Young Officers: Problems of Coming Into Being: Brothers Serve Together as Fighter Pilots

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[Article by Maj V. Zdanyuk: "Watchmen of the Sky"]

[Text] Flying his airplane at its flight ceiling, Senior Lieutenant Sergey Malyarchuk kept the flight commander's craft in sight. The airplane was unstable at this altitude. He had to be maximally attentive and composed. Besides that, the pair had to carry out a number of maneuvers.

The leader banked his missile carrier into a dive. Sergey repeated the maneuver. Dark haze-blanketed copses and square emerald-green farm fields flickered through clearings in the clouds as in a kaleidoscope, and a lake shimmered in the distance. The leader and follower were just above the clouds when they recovered from the dive. Then they flew a few more patterns and headed back to their airfield. Both landed not long after that. Malyarchuk received an outstanding score for the flight.

As Sergey was taxiing to the parking apron he suddenly heard through the chatter on the radio:

"Zero-Five-Seven, permission to take off granted...."

But that was Sasha! This was his day for an important sortie. In an instant he imagined his brother in the cockpit of the missile carrier. He's anxious, of course, but he has himself under control. What a good lad! He may have his faults, but he never lacks will and stubbornness.

Moments later Aleksandr Malyarchuk's fighter was racing along the airstrip, swiftly gathering speed. Afterburner flames scorched the concrete.

Sergey felt proud: His brother was replacing him in the sky like a watchman at his post. And that in general is the way things are. They were entrusted with the job of protecting the peaceful skies of the motherland.

Quite recently their father also used to go aloft in his missile carrier. He was the one who had the greatest influence on the life's path selected by his sons.

Sergey graduated from a vocational-technical school. Having done so with honors, he was entitled to an advantage in admission to a VUZ. He was interested in electronics, and he had already chosen the institute he wanted to go to. But then he received a telegram from his father: "Go to Armavir." This jolted him out of his complacency. He recalled the aviation garrisons in which he grew up. He often went to sleep and woke up to the roar of jet turbines. He and his brother did not see their father very often. And yet when they did spend time together, talk about airplanes and heroism in the sky continued endlessly.

Sergey knew from long experience that a military pilot's work is hard and troublesome. But at the same time it was attractive and romantic. How could he possibly forget the time when his father took Sasha to the airfield and led him to an enormous aircraft! After that he and his brother witnessed many times how effortlessly these multiton missile carriers rose into the sky, flew toward the horizon and disappeared into the blue haze.

All doubts and vacillations melted away. Sergey Malyarchuk became a cadet at a higher military aviation school for pilots. He studied well. His interest in electronics also turned out to be very useful.

Aleksandr set off in the footsteps of his father and older brother. True, things did not go smoothly for him in all things. His first attempt to enter flight school was unsuccessful: His health let him down. Sergey encouraged him: "Don't bother yourself with it. You're sure to get in next year. We'll still have our chance to fly together!"

Aleksandr did not use his time idly. He also went to a vocational- technical school and acquired the specialty of radio apparatus repairman. He devoted considerable time to sports. He grew stronger and matured. Then once again he traveled to the school. This time the doctors had no complaints as to his health. He passed his examinations.

Prior to his graduation Aleksandr asked to be sent to the military district in which his brother was serving. His request was satisfied. And now the brothers are in the same regiment, where they are persistently improving their combat proficiency.

Aleksandr Malyarchuk returned to the control tower from his flight somewhat disturbed. They asked him what was wrong. As it turned out, the young pilot made a mistake in piloting technique, failing to maintain his speed while landing.

"What did the commander do?" Sergey asked him. "Did he chew you out?"

"No. He explained why I made the mistake. Then it all came clear to me."

"Let's plot your flight pattern," Sergey proposed. "Let's sit down together and figure out where and why you made your mistake."

Aleksandr listened to his brother attentively, and asked him questions. They went through several sheets of paper before getting up from the table.

Malyarchuk the younger corrected his carelessness in the very next flight shift. His brother's advice did not play the last role in this. And that day Sergey successfully intercepted a simulated enemy airplane beyond the clouds.

He took his place in the airplane cockpit at the time when Aleksandr was on his landing course. He settled himself down in the chair comfortably and scanned the instruments, switches and signal panel with his eyes. Then he broke his attention away from the instrument panel: The fighter piloted by his brother was coming in for a landing.

The landing strip came nearer and nearer. Aleksandr was piloting the aircraft well. The wheels met the concrete smoothly. The missile carrier ran down the runway, decreased its speed and taxied to the parking apron.

Now it was Sergey's turn to climb into the sky.

His target maneuvered in course and altitude. Suddenly it made a steep turn, climbing once again. There was little time to think out the response. But Sergey quickly made the decision to attack with the sun behind his back. The maneuver was successful, and the simulated enemy was unable to escape the interceptor.

This is the way Sergey and Aleksandr Malyarchuk and their comrades are serving, stubbornly mastering their professions as fighter pilots. They are ordinary lads upon whom the motherland imposed a very difficult and important job—protecting its air borders.

11004

In the Arsenal of an Aerial Fighter: Innovative Techniques Result in Good Aerial Combat Training

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[Article by Maj G. Zarva, military pilot 1st class: "In the Squadron—Short Tactical Exercise for Officers"]

[Text] Major Yu. Priymak's squadron took off for aerial combat training.

The tactical groups assumed their places in accordance with the plan. Soon after the command post transmitted the warning that the simulated enemy had appeared. A few seconds later information was transmitted to paint a sufficiently clear picture of the situation in the air. The commander quickly estimated the situation, adjusted his plan, updated the missions of the group leaders and calculated the moment of engagement in combat. When the time came to put his combat formations into action, Major Yu. Priymak gave the appropriate command. Fighters began their maneuvers in preparation for combat.

Unexpectedly the leader of the strike group, which was to enter into close fluid combat capitalizing on advantageous conditions created by actions of a feinting group, transmitted the message: "The 'enemy' has disappeared in the clouds. I have no visual contact. I'm breaking off the attack."

With the help of the combat control officer a back-up group was committed to combat. It attacked the simulated enemy from long range. Naturally the effectiveness of this group's strike was more modest than that which had been predicted for the strike group, and therefore the results of the subunit's sortie turned out to be significantly lower than expected.

Major Priymak could not conceal his anger after landing. The rest of the pilots felt the same. But emotions are not what is important. The cause of the failure had to be sought. Finding the weak place in the plan, on which he and the entire collective had labored for so long, was hard work. He had an urge to blame someone—for example pilots of the strike group or the command post. But this would not reveal the truth. After carefully thinking out the situation, the squadron commander convened the flight crews and issued a warning:

"A week from now we're going to have a short tactical exercise on a topic corresponding to the plan of our recent battle. I ask everyone to think out the details once again, and to find the weak points in the plan and the ways to shore it up."

All ongoing activities attested to the fact that the subunit lived in anticipation of the exercise: the debates, the dozens of sketches, the ground training. The commander did some hard thinking as well; he did not try to seek conclusive answers to all of the questions that arose. He created scenarios of the forthcoming assignment and concerned himself not so much with irreproachable answers as with dynamic questions. Unexpected scenario inputs should help break the situation in the air down into its elements, while the answer to the pilots should reveal the mistakes and suggest the right solutions for the future plans and decisions.

There was one other idea that the commander adhered to. He was convinced that the short tactical exercise had to become a unique sort of game. In other words he had to remove all constraints from the occupational fantasizing of his subordinates, unchain their tactical creativity, discard no idea categorically, create the conditions for free discussion, evoke debate on each particular element, and encourage the pilots to play out the different combat roles, even up to that of the combat control officer. And of course, all participants of this exercise had to be given the opportunity to speak what was on their minds.

The tactical exercise went on for an unusually long time. The clock said that the work day was over, but no one paid it any attention. This was the first time in his service as a commander that Major Yu. Priymak heard

so many tactical ideas, solutions and proposals. This was not a question-and-answer evening but a real struggle between opinions. Each input was not necessarily followed by a solution. More often than not they were followed by new inputs and puzzling questions that compelled everyone to think, to analyze the situation and to make a new decision. For the first time the commander himself was unable to answer all questions either. Showing no embarrassment, he wrote them down in his notebook.

Gradually it became clear to the commander why that battle had been unsuccessful. But he was not in a hurry to end the lesson. It was not until the officers began repeating themselves that he summarized:

"And so, comrades, now we know one more rule of tactics: Rigidly defining the roles of tactical groups and their missions is a form of stereotypy that gets in the way in combat when any surprises occur. Such as in the weather for example, as happened in that flight. There was only one cloud in the entire area, but it was precisely there that engagement in close combat occurred. And if I had been able to predict this in time, other pilots would have carried out the feint and the center of the battle would have been shifted into a favorable area. It stands to reason that the personnel must always be ready to perform in any tactical role—that is, any part of an overall plan.

This was but one flight, one lesson in the life of the subunit of fighter pilots. But there were so many useful things that the aviators were able to learn. One might of course think that all of this does not deserve such detailed discussion. But let us try to evaluate the uniqueness of this episode from the standpoint of instruction methods.

First of all the topic of the exercise was determined not by the schedule but by the flight itself. Unfortunately this was not a frequent thing. All the more so because a planned exercise had been conducted prior to the flight, and the commander training schedule could have been calmly checked off as having been completed. And then the next topic could have been taken from the same approved document.

Second, because the combat plan, which was essentially good, had not been carried out, this situation aroused the interest of every pilot. Frankly speaking such interest rarely precedes tactical exercises.

Next, the goal of the short exercise was posed in a different way, and even unexpectedly. All participants were encouraged to participate in joint creativity and thought. The final opinion was not determined by rank. This was a thoroughly grounded debate among equals, it was independent or seniority of the flying experience of the specialists.

Moreover the exercise was carried out according to the rules of a business game—that is, a struggle was organized between professional minds, in which the tactical solutions of some aviators were attacked by the opposing arguments of others.

Finally not only tactics but also psychology were accounted for during the exercise. Each point of view was assessed not by points but by victory or defeat in the air. In 3 hours of debate each pilot not only enjoyed a victory but also suffered a defeat. That is, a "battle" went on in the classroom. The pilots were able to feel how complex a modern aerial engagement is.

But perhaps the main distinction of this short tactical exercise was that it modeled a situation in which a single battle was broken down into many elements, each of which involved questions that required a concrete answer from the soldier participating in the overall assignment.

Incidentally that flight and that short tactical exercise encouraged Major Yu. Priymak to seek new procedures for conducting similar exercises. With time the most sensible variant was worked out, and its structure was documented in the form of a table.

Let us briefly explain this table. Column A contains information pertaining to the conditions under which the combat episode under discussion is proceeding: the weather, elements of friendly and foreign air defense systems affecting the course and outcome of combat, the state of the radar fields and so on.

The situation is diagrammed in column B, and the parameters required for substantiated solutions confirmed by calculations are indicated.

Column C is a kind of self-check on the commander: If the situation provides the grounds for only a single variant of the solution, the person who developed the exercise would have to recognize that he had been unable to come up with an instructive situation with rich

Tactical Exercise Episodes	Weather and Other Factors of the Situation	Graphical Diagram of the Combat Situation	Possible Variants of the Solution	Additional Inputs	OIC Grade	Problems
1 2 3	A	B	C	D	E	F

tactical content—that is, he had been unable to model an acute aerial conflict. All variants proposed by the pilots during the discussion are documented here as well.

Inputs written up earlier by the commander and those which came up in the course of the exercise as "counteractions" by the participants of the tactical game are entered into column D.

The purpose of column E is obvious. The only subtlety is that the grade is assigned not for just one idea but on the basis of the results of the entire exercise, and not so much on the basis of the faultlessness of the answers as on the originality of the ideas and the activity displayed.

Column F includes problems that could not be resolved in the course of the tactical exercise (there was not enough training time, the debate between opposing opinions ended in a draw, the analysis was not exhaustive, the problem deserves special analysis). This is where questions and topics for future tactical exercises are concentrated; they are not necessarily to be addressed in a short tactical exercise for officers.

The work experience using this procedure shows that the number of episodes included in the plan for the exercise depends on the training time available, the topic of the exercise, the novelty of the material under discussion, the content of the training problems and the level of the military collective (squadron, flight). As a rule it would be suitable to have two or three episodes in a squadron exercise, one or two in a flight exercise and one specific episode in an exercise for a single pair of fighters.

It should also be noted that in the course of the exercise the commander should artfully combine the planned course of the exercise with possible deviation into some new, unforeseen situation. The main thing is to support purposefulness and creativity. Rigid adherence to the plan impoverishes the results of the tactical lesson, while spontaneity does not produce an exact result and produces a tangle of questions to which the pilots do not receive substantiated answers, recommendations or even reference points for independent professional enquiry.

Once he finds a particular method, Major Yu. Priymak does not stick with it forever. New techniques of tactical training are experimented with. For example sometimes the subunit is divided into two groups, each of which creates tactical difficulties for the other. Sometimes someone (a pilot, a pair, a flight) is given the job of developing a series of inputs for a planned episode. The squadron commander even dreams of the time when a tactical engagement could be played out on computer screens. He puts thought into the principles of programming, he masters them without the fear of suspicions of eccentricity, and he is working to eliminate what he admits to be his computer incompetency.

I have conducted a rather substantial discussion of how the aviation commander carries out one of the forms of tactical training with the hope that some part of Major Yu. Priymak's experience would be accepted, used and developed by others. Of course the problem raised here is extremely narrow. Everyone is familiar with all the things I have talked about. Any aviation chief could list the requirements on tactical training without a second thought. And anyone can name a dozen of the most progressive procedures of military aviation training.

But in our air force life for some reason we still encounter—and frequently at that—the apparent paradox where a young pilot stands at the blackboard and strains to answer questions as to the composition, basing and the principles of combat use of carrier task forces. He shifts his weight from one leg to the other and thinks: "Am I really going to have to fight alone against this damned carrier task force, which contains perhaps 200 or even 600 warplanes?" And while his supervisors drill the hesitating lieutenant with their reproachful stares, the pilots in Yu. Priymak's squadron learn to fight the probable enemy's airplanes, pairs and flights. And they are proceeding quite correctly.

11004

Flight and Psychology: Experiments Study Aircrew Monotony in Automatic Flight

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[Article by professor, Maj Gen Med Serv V. Ponomarenko, candidate of medical sciences, Lt Col Med Serv V. Kostritsa, and Capt Med Serv S. Yegorov: "Attention: Automatic Control System!"]

[Text] Modern military aviation is devoting continually greater attention to increasing airplane flying time and widely introducing automatic control systems. Longer presence of an aircraft in the air significantly widens the range of its combat use, and an automatic control system significantly increases the pilot's capabilities in so- called combined activity—searching for and detecting objects during air reconnaissance, and aiming at a ground or air target. These operations are always carried out simultaneously with piloting the airplane. They all make equivalent demands, and not one of them can prevail over another without detriment to the quality with which they are carried out. When an airplane is piloted by an automatic control system, not only does the effectiveness of fulfilling a combat mission increase, but also it becomes an indispensable necessity.

The traditional autopilot has long been a faithful helper to crewmembers on long flights. Owing to its use, development of fatigue can be postponed. This is doubtlessly positive.

But is everything all that simple in this issue? Automation of airplane control reduces the physical load but, as the experience of flight crews and research show, it increases mental loads. This is associated with change in the nature and content of the work being done. Rather than directly controlling the airplane, the pilot only monitors the actions of the automatic control system—that is, he is in a sense excluded from the aircraft control loop. This "incomplete" inclusion in airplane control is aggravated by the fact that signals from the visual analyzer, which are the basis for formation of the "feeling of the airplane," are absent in automated flight.

Flying experiments have shown that the precision with which prescribed parameters are maintained upon transition from an hour's automatic flight to manual piloting drops by 25-50 percent. Use of automation reduces the pilot's mental activity. Especially in lengthy and stable flying conditions, the work of an automatic control system is monitored in a distinctly monotonous external situation, including on the background of referenceless terrain, in the absence of visibility of natural landmarks in flight at high altitude or at night.

The monotony of conditions and of the work being done creates a monotonous situation, the action of which upon the individual over a particular amount of time results in development of a specific mental state—sensory monotony. Sluggishness, sleepiness, apathy and boredom appear, and interest in work is lost. The crew monitors the work of the automatic control system less reliably.

But the problem of monotony has not yet been studied well at all in application to aviation. Could it be that it is not that important to flying? The study of monotony and its negative influence on the quality of work by professional flyers and the high price of possible error suggest that this is not so.

Here are two cases described in the foreign literature. During a trans- Atlantic flight using an automatic control system, failure of the autopilot occurred in one airplane without warning, and it lost 1,000 meters of altitude. Another in a similar situation went into a descending spiral and lost 9,000 meters. As we can see, both times flight safety was threatened owing to untimely detection of parameters straying beyond permissible limits.

An experiment with highly qualified pilots was conducted in order to reveal the mechanism behind the decrease in effectiveness and reliability of the crew's actions in automated flight under monotonous conditions. The flying assignment included a 6-hour flight using an automatic control system. The main objective was to monitor the precision with which prescribed flight parameters were maintained, and if they were to stray beyond permissible limits, to immediately report this to the experimenter. In addition the pilots had to monitor piloting precision, and at the end of every leg of the flight they had to retune themselves to the next route checkpoint.

Besides evaluating the quality of the activities of the aviators, the experimenters monitored their state. Their subjective self-assessment of activity level was recorded by means of a number of physiological indicators. Video cameras constantly observed the behavioral reactions and motor activity of the pilots. After the work was finished the experimenters conducted interviews and filled out questionnaires.

Processing and analysis of the experimental data showed that in the first 2-2.5 hours of flight the subjects developed a classical symptom complex of monotony: impoverished facial expression, lengthy stares at a single point, frequent yawning and minimum motor activity. Their condition was confirmed by electroencephalograms. Brain bioelectric activity was dominated by slow rhythms indicating inhibitory processes. But the work quality of the pilot remained at a sufficiently high level. Around 75 percent of the deviations from prescribed flying conditions created by the experimenter were detected promptly by the pilots. In the other cases the delay of the response was from 10 seconds to a minute.

After that the picture changed. The expressiveness of external manifestations of monotony decreased, while motor activity increased significantly. A ratio of rhythms close to the initial data of an active state were recorded on the electroencephalogram. It seemed as if this could be assessed as being positive. But the quality of monitoring the automatic control system dropped dramatically. Only 30 percent of artificially introduced deviations were recognized promptly. In the other cases the reports were made with a delay of up to 3 minutes. A seeming paradox was observed: The reliability of monitoring the work of the automatic control system decreased on the background of higher activity and alertness.

The search for the causes led to an analysis of questionnaire responses and notes from pilot interviews. It was revealed that at first, despite the unfavorable effect of the situation's monotony, attention was directed at fulfilling the assigned task. This required volitional effort to maintain a relatively high level of activity. Later on this turned out to be insufficient. An empirical search for means by which the level of alertness could be increased was begun.

Here is what the pilot typically said in this regard: "At the beginning of the experiment I concentrated on the assignment. I had to fight drowsiness and sleepiness. Then I realized that the work would be long and uninteresting. My attention began switching to incidental things." This change in the orientation of attention represented an effort to "invent" supplementary techniques for maintaining activity. The specific procedure for artificially maintaining activity was individual, but most often the pilots sang, whistled a tune, usually a rhythmical and popular one, they recollected verses, thought about work and personal affairs, and "studied" the cockpit fixtures. This filled the "sensory vacuum" created by the nature and content of the activity as well

as by the conditions in which it was carried out. These techniques to maintain activity turned out to be effective. The expressiveness of the signs of monotony decreased.

It is important for flight crews and flight controllers to remember the conditions under which this unique mental state arises in automated flight. It manifests itself as substitution of the goal of the flight by a struggle with apathy and monotony. The personality is activated through its own resources. Hence arises a real and sizable danger: The pilot's unreliability in the airplane control system is camouflaged. Although the individual is active and there seems to be no cause for concern, actually the motive of activity undergoes unnoticeable substitution. As a result, the experiment confirmed, control over maintenance of parameters worsens dramatically, and latent unreliability of the pilot's work surfaces. This is not an accidental but a predictable phenomenon. Figuratively speaking as soon as the motive of actions strays from the working goal of a flight, control over its parameters immediately begins to worsen and general perception of flight factors diminishes, generating a high probability of unsubstantiated decisions and incorrect actions.

Thus we can assert that reduction of the reliability of a pilot participating in a long flight using an automatic control system is associated with reduction of mental activity and shifting of its orientation from the tasks of professional activity to incidental topics. This is something flight crews participating in lengthy flights must remember.

It is important to emphasize one other point. Many pilots in long-range and military transport aviation know the ways to correct unfavorable states arising during lengthy flights. These states cannot be ignored. Using special systems of physical exercises and self-massage of biologically active points have proven themselves well as techniques by which to raise the overall level of the body's activation and to prevent fatigue. Their beneficial impact is indisputable. At the same time their use does not solve the problem in its entirety. New methods of preserving, maintaining and restoring a pilot's mental activity must be sought.

What can we propose? The experiment showed that as a rule the quality of the activity of a flight crew is high in the vicinity of a route checkpoint. Not a single case of tardy or incorrect actions was recorded when deviations were introduced just before a checkpoint. In our opinion this is associated with a high motivation for monitoring flight parameters in these stages of flight, which are objectively more complex. The success of carrying out the entire assignment as a whole depends on clear and error free work by pilots at such moments.

In this connection the route checkpoint becomes a stimulus of mental activity, as is confirmed by objective data. Thus oculomotor activity, which reflects an individual's capability for perceiving incoming information, grows by a factor of 1.5-2 in the vicinity of a checkpoint in comparison with other portions of a flight. The subjective assessment by pilots of their own performance also rises significantly. Thus mental activity promoting high quality fulfillment of an assignment can be maintained by increasing the number of checkpoints of objectively high significance.

To test this hypothesis a control experiment was carried out in which the time of monotonous portions of a flight was reduced. The results confirmed that on "short" legs of a flight the pilot was able to maintain the orientation of his attention on fulfilling his occupational task, that he continually maintained an integral image of the specific flight situation, and that this ensured high reliability of monitoring the work of the automatic control system.

Considering the above, in order to optimize pilot activity in a lengthy flight using an automatic control system it would be suitable to introduce supplementary intermediate reference points between regular route checkpoints. In addition it would be a good idea to monitor more frequently the work of systems which are usually used rarely. This makes it possible to maintain the orientation of attention on the objectives of professional activity.

Monitoring one's own state is an important factor in ensuring a pilot's high reliability in the control loop of an airplane using an automatic control system. Research data show that flight crews cannot limit themselves to just subjective sensations and experiences; they must critically evaluate the quality of their own activity on the basis of its practical results attained in a specific flight.

The experiments persuade us as to the need for increasing psychological support to the process of training and indoctrination when assimilating new equipment and new types of flight work. Now that a crew controlling an aircraft is compelled to interact more and more with technical assistants, a knowledge of the individual's mental state is extremely necessary. The professional culture of a flight crew is defined not only as a knowledge of tactics, the equipment and aerodynamics, but also a knowledge of the laws of psychology. The ability to control oneself is the foundation of the reliability of controlling the entire crew- airplane-environment system, all the more so when the pilot interacts with the airplane not directly but by way of an intermediate link—an automatic control system; that is, when he is essentially included in a control system of greater complexity, the crew-computer (automatic control system)-airplane-environment system.

11004

For High Combat Readiness: Regular Physical Exercise Improves Flying Performance

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[Article by Col Ye. Sein, air force chief of physical training and sports, USSR master of sports: "Not Just to Be Fashionable"]

[Text] The flight shift was coming to an end. Aviators who had returned from their flight were removing sweat-soaked helmets and pressure suits in the control tower. Everyone felt tired: The flights for combat use were abundant with complex exercises requiring considerable moral and physical effort.

After changing, Lieutenant Colonel D. Kutsokon turned to the others:

"We've got volleyball scheduled today. Let's get together on the court at seventeen hundred!"

He let out a broad smile and headed for the exit.

This was a rather long time ago. It was then that I became acquainted with this military pilot-sniper and fabulous commander. Lieutenant Colonel D. Kutsokon maintained a special place in his heart for sports. One would have thought that with time, as often happens, this love would gradually fade away, and his busy schedule would have its effect. But nothing of the sort ever happened. Kutsokon, a major general of aviation today, has remained true to his habit of engaging in physical training, and he always finds time for it. He devotes an hour a day to training and to the performance of various physical exercises. And I must say frankly that this is the main secret of his long flying career and high professional skill.

Physical training is an important component of the training and indoctrination of the personnel. The high requirements that are imposed today on aerial skills also contain rigid requirements on the health of a pilot piloting an aircraft system. Yes, modern aviation technology makes it possible to do things that could not be done in the recent past and that were the dream of every air warrior. In other words we have arrived at the point where this question arises: Is this thing within the grasp of the individual's strength, his psychophysiological capabilities? It is entirely clear, after all, that no matter how sophisticated equipment might be, the individual, together with all of his physiological and mental qualities, and his capability for utilizing the tactical possibilities of the airplane, has been and continues to be the decisive factor, especially in combat.

Aviation needs strong, healthy people capable of withstanding any stresses and physical loads that may arise in a combat sortie. This requires harmonic development of the body with emphasis on nurturing resistance to stress factors, on achieving high performance, coordination of actions and resistance to accelerations and rocking as well as other unfavorable flight factors.

This is especially important today, now that the personnel are assimilating airplanes of a new generation characterized by higher maneuvering qualities, greater range and longer flying time. In this connection the question of choosing effective procedures by which to prepare a pilot to endure high and lengthy sign-variable accelerations and to surmount the unfavorable influence of monotonous work during a long flight stands urgently before specialists in physical training and aviation medicine. Excessive weight, which reduces the body's resistance to the above-mentioned factors, is also a serious problem. Unfortunately our specialists in aviation medicine are still not providing effective recommendations on ways to combat excess weight. This is a problem that must be dealt with seriously in close interaction by both specialists in physical education and doctors on the basis of plans drawn up individually for each crewmember.

Physical training plays an active and dynamic role in improving physiological and motor functions, and it is an effective means of training and nurturing many professional qualities characterizing the pilot's personality. Organizational and methodological work being done in the air forces in regard to physical education of the personnel is not just something that has come into style—it is a requirement of combat readiness, safety and a long professional career. Collectives in which commanders correctly understand the role of physical education and do everything they can to offer regular physical training enjoy immeasurably higher combat training indicators.

However (and this is no secret to anyone) sometimes aviators participating in commander training and preparatory days busy themselves with things far distant from primary necessity, things which leave no time for organized physical training. People do not notice how their psychophysiological resistance gradually declines, how fatigue sets in, and how health deviations and the resulting diagnoses in the medical booklet appear unnoticeably. Over the years such deviations transform into a persistent pathological state. The older a person becomes, the faster this process goes on.

Feeling this, comrades begin to harken back to sports and physical training as a means of correcting the situation. But to be truthful it is often impossible to improve one's health and recover lost ground in this way. Besides everything else, attempts at heavy exercise too late harbor the danger of irreversible damage to one's health. Everything must be done in moderation, wisely. The advice of a physician and of physical education specialists is mandatory.

What needs to be done to make physical education and sports a firm fixture in the life of every aviator, to become a daily need? I am completely convinced that an

interest in sports, in physical education as an inseparable part of overall culture must be resurrected first, that aviators must be instilled with a constant desire for physical self-improvement.

I know very many pilots who owing to continual training are always in good athletic shape, and they are able to withstand all flying loads fabulously at a maximum professional flying age. And anyway, who really knows what this maximum age is for a pilot? We might perhaps cite things written by medical experts on flying, but it seems to me that the main thing is not how a given pilot should be categorized in terms of his health and age, but rather how to evaluate his health and his physical preparedness to endure unfavorable flight factors, and his capability for working and surmounting all difficulties.

Love for sports and physical pursuits must be infused into young people back in their student years; it should be constantly suggested to them that this is being done in their interests, that good health is a factor of both combat capabilities and length of professional career. In the end, this is not only a personal matter for the officer-aviator but also a state matter.

This is the way things are in most flight and engineer-technical schools of the air force. Moreover in some of them eager officers and cadets serve as sponsors of schools in cities where these VUZes are located. They prepare young people having a desire to enter the given VUZ after finishing their 10 years. This is the way things are done as an example in the Tambov Higher Military Aviation School for Pilots, in the Chelyabinsk and Voroshilovgrad higher military aviation schools for navigators, and in a number of engineering and technical schools. And it must be said that this work is producing its results: Many applicants who had been trained under such sponsorship programs successfully pass occupational selection in regard to physical fitness.

In general, physical training is not something that is carried out sporadically in aviation schools; it is organized into a clearly balanced, methodologically substantiated system. This has become possible owing to the fact that commanders and instructors understand quite well that only a physically well-prepared specialist can successfully operate modern aviation equipment on the ground and in the air. And regular, purposeful physical exercise generates qualities in the future pilot necessary for combat, ones such as boldness, decisiveness, courage and purposefulness.

Life shows that he who keeps himself in shape constantly is able to successfully master all of the complex forms of combat training. Many commanders and political workers who have reached substantial age are not inferior to young pilots in strength, agility or swiftness of reactions. As a rule they competently organize mass sports, they turn their attention to keeping the sports training base in good condition, and they serve as an example to subordinates of what kind of results can be achieved through persistent, regular training.

The attitude of flight crews, engineers and technicians toward physical education and sports depends in many ways on the regiment commander, on the school chief and on their deputies, on the position they occupy in the organization of physical training lessons and sports functions, and on their personal participation. The strength of an order and personal example are powerful, dynamic resources by which to achieve the goals of physical training.

An inspection of personal physical training of the commanders of air force units was carried out last year. It must be noted that some produced far from brilliant results. Some even earned unsatisfactory and failing grades. The obvious question is how could a commander who is himself poorly prepared in physical respects able to serve as an example to subordinates? This situation cannot be condoned. The commander must be first everywhere and in all things.

Mandatory morning physical training exercises have now been introduced in many aviation garrisons. This is typical of the air forces of the Group of Soviet Forces in Germany, the Southern Group of Forces, some air force units of the Odessa and Carpathian military districts and of military transport aviation.

But a single hour in the morning will not solve this acute problem in its entirety. It is very important to organize the work in such a way that the requirements of the Physical Training Manual would be satisfied in the units: The training must be made regular, it must not be susceptible to cancellation, and it must be made just as mandatory as flying. Every aviator and commander must remember that physical training is an inseparable part of combat training, and that steps must be taken to upgrade the quality of the lessons.

Mass sports are an effective means of attracting all servicemen to physical education. In the collective in which Major V. Serdyuk is a member of the sports committee, competitions between the aviators on norms of the military sports complex, physical training reviews, sports holidays and competitions are conducted before the eyes of all personnel, in the presence of the families of the servicemen, and frequently with their participation. In this situation even those who had not formerly distinguished themselves by a conscious attitude toward sports training are compelled to stay true to form, lest they soil their reputations before the public and even before their own families. All of this elevates the mood of the soldiers and helps to reinforce combat readiness.

There are examples of the other sort as well. Sometimes we hear some commanders and chiefs justifying their inactivity in regard to organizing physical training and sports and unjustified cancellations of planned exercises by citing too

high a workload or poor basing conditions. To be honest I experience a sense of discomfort and shame in regard to such chiefs whenever I listen to their excuses.

The elements of formalism, indifference and irresponsibility have not yet been eradicated from some flight schools. During inspections some physical training leaders go to extreme measures to conceal physically weak students and officers. This is the most blatant irresponsibility and concealment. This can be the only explanation for the low level of physical training of the personnel in the unit in which Officer S. Salamatin serves, as well as of students and officers of the Borisogleb and Syzran higher military aviation schools, where lieutenant colonels P. Belov and I. Demidov are the chiefs of the physical training and sports departments. Such an attitude toward the work by officers who by their position are obligated to zealously monitor formation of the physical and psychological qualities of the future defenders of our motherland's sky is incomprehensible, to say the least.

It might be suggested that such comrades either do not fully understand their role and the role of those whom they are training, or they intentionally ignore the requirements of the documents regulating the training process and the combat training of aviators. But no matter what the truth is, in either case tangible harm is done to combat readiness. It is entirely obvious, after all, that flight crews, as well as other aviation specialists, are servants of the state. And the longer an air warrior serves the fatherland, the better. Experience and health are precisely what the interests of the Soviet Union's defense demand.

11004

Practical Aerodynamics For the Pilot: Attention Distribution and Aerial Combat

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[Article by Lt Col A. Mashchenko, military pilot 1st class: "Piloting in Aerial Combat"]

[Text] Captain Yu. Bezrukov was engaged in ordinary aerial combat training. The simulated enemy began an energetic descending maneuver. Bezrukov performed a half-turn and raced toward the target. Moreover he did not simply repeat the trajectory of his rival's flight; instead, figuratively speaking he screwed his fighter more and more energetically into the curve along which the "foe" flew, waiting for the moment of a missile strike. At this moment the combat control officer asked Bezrukov:

"Do you have visual contact with the target?"

The pilot understood the question, but being engrossed in the situation, he did not reply.

The command post asked him once again:

"Three Forty-Five, do you see the target?"

"Oh, leave me alone," the captain thought in his annoyance. In that instance he was close to success: The cross-hairs were over the simulated enemy.

"This is Three Forty-Five, I am attacking, I have the target stably in view," Bezrukov reported to the command post.

It seemed to the pilot that he had done everything in parallel: piloting, aiming and reporting. But suddenly he discovered that he could not lock onto the target, that the enemy was approaching quickly, and that the airplane was responding sluggishly to the controls. The situation was such that the pilot had to abandon pursuit and switch his attention to flight safety. Quickly evaluating the flight conditions, Captain Yu. Bezrukov understood: He was at supersonic speed! Efficiently doing everything necessary, the pilot safely completed his descending maneuver and performed a chandelle. Safely, yes, but now in the role of the attacked, and additionally in circumstances not foreseen by the assignment. What was their cause?

At first glance the answer is obvious: incorrect switching of attention, absence of clear interaction between the pilot and the command post, and insufficient preparation for flying. There could be no objections to this. But one doubt still remains: In real combat, would the pilot have the possibility for switching attention with absolute precision, would he be able to interact clearly with the combat control officer, and prior to taking off would he be able to accurately predict exactly what awaits him in the air?

This brings us to a problem concerned with the features of piloting in aerial combat.

As we know, piloting technique in aerial combat, or more precisely, the manner of piloting in the course of combat maneuvers, involves developing decisions on the basis of an analysis of flight information and subsequent transformation of the piloting decisions into working movements. This is the way a pilot controls his airplane in all situations—in horizontal flight, when landing, in clouds and in clear weather, and in aerial combat. But at the same time airplane control does have its unique features depending on the specific conditions, and the nature and conditions of flight.

When a fighter engages in aerial combat, the work volume rises dramatically right away. In the course of combat the pilot makes tactical decisions, he selects a sensible fire plan, he uses the sighting system, he operates the necessary controls, he sets and monitors the

engine operating conditions, he maintains radio traffic, he coordinates with other crews, and of course he pilots his airplane. Many other things could be added as well. For example he does battle with his emotions. One thing is clear: A pilot's work in aerial combat is not at all limited to just control of the airplane.

But anyone who has participated in advanced aerobatics even once would say that piloting in the course of aerobatic patterns and maneuvers is itself very hard work, leaving not that much of an attention reserve. How is an airplane to be piloted in combat if a large number of additional tasks must be addressed during flight? Once again a simple and obvious answer begs itself: Piloting in combat must be quite different from piloting in the most advanced aerobatics. Then the question is: In what way? The answer to this question is much harder. Nonetheless we will try to answer it.

I think that the main features of piloting in combat include, first of all, a drastic reduction of the proportion of attention a pilot can devote to piloting. Second, there is the drastic decrease in the precision and completeness with which flight information is perceived. Third, qualitative change occurs in the sources themselves of flight information. Fourth, the required motion parameters depend not on one's own will but on the opponent's movements. Fifth, it is almost entirely impossible to continually monitor the precision of movements of controls. And finally, the tactical or combat mission assumes the forefront.

These features do not exhaust all off the uniqueness of piloting in aerial combat. These are simply what I believe to be the dominant ones.

What would be helpful in surmounting these features and making piloting not only possible but even easy? And I mean easy (to the extent this is possible in the very hard work of an air warrior), because there are enough difficulties in combat without piloting complexities.

Let us examine the information side of piloting. Understandably the sharp decrease in time that may be expended for piloting purposes, the just-as-critical decrease in precision of receiving flight information and the impossibility of continually monitoring the results of actions taken with the hands compel the pilot to work with discrete batches of flight information. But the reliability of piloting must not raise any doubts. I think that the solution here is to change the approach itself to piloting. This means that in every maneuver the pilot must be able (must know how!) to isolate the sole motion parameter which determines the dynamics of the airplane as a whole, to understand precisely the limits within which the selected parameter is in fact dominant, to know when to switch to another parameter, and to know what to use as the new dominant parameter. But even this sole parameter cannot be assessed constantly and precisely. Consequently the solution is to competently determine the trends and prospects of its changes.

For example assume that a fighter pursuing an opponent is performing a turn. Current speed must be assessed at the moment the turn begins. Relating it to the engine operating conditions and comparing it with the aircraft's maneuvering characteristics, the pilot must accurately "compute" the tendency for change in speed depending on accelerations. And then, even without monitoring the speed, the pilot is able to understand the pattern of his speed and control it by changing acceleration: To reduce it he would increase acceleration, while to increase it he would reduce acceleration.

But then this question comes up: What difference does it make as to where the time is spent—on reading the speed or reading acceleration?

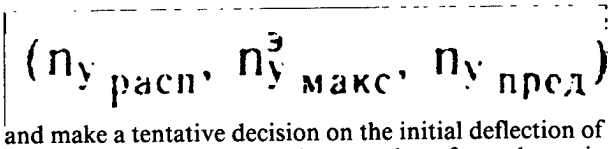
In this situation, it does make sense to associate piloting with acceleration. First of all acceleration effectively affects the form of maneuver. Second, mistakes in reading acceleration are smaller than in reading speed. Third, change in speed can be effectively influenced by change in acceleration. Moreover acceleration is monitored not only by instruments but also by sensations (at least in regard to change in acceleration). But the trend must be assessed before committing to the roll. If speed is low and continues to decrease, until it returns to a safe value the main attention should be devoted to it. If it is high and is growing, then a transition to piloting on the basis of acceleration alone would be impossible without first reducing speed by decelerating (with brakes, by throttling the propulsion unit).

Piloting technique undergoes significant restructuring because the customary sources of flight information that are naturally employed in independent piloting are unacceptable in combat. The attitude of the airplane in space and the maneuver itself (its configuration, its parameters) cannot be determined in combat on the basis of the sources of information to which the pilot becomes accustomed when carrying out aerobatic maneuvers. What pilot is not familiar with the situation where he is unable to completely reconstruct the pattern of a recent aerial battle? And yet the flight situation was quite normal, and the results, which are confirmed by the flight recorder, show that the pilot had done everything correctly. What had he chosen as his source of flight information used in the course of the entire battle? An experienced air warrior would say that the source of flight information was the simulated enemy's airplane. The latter excellently performs the role of a unique "artificial horizon" in combat.

Of course, piloting in reaction to one's opponent is not a very simple thing to do. It does not, after all, reduce to elementary observation of the movement of the airplane engaged in combat, or to primitive repetition of the other airplane's maneuvers. To pilot successfully in reaction to the opponent, an entirely new level of professional skill is required.

Take for example a knowledge of flight dynamics and the ability to utilize them during piloting, one component of occupational skill. One would think that combat does not require accurate calculations, which simplifies the effort. But let us return to the moment of commitment to a turn, discussed above.

Evaluating the motion parameters, determining the tendency for change in speed and making his decision in regard to maintaining the particular conditions of acceleration, the pilot must carry out a very deep analysis almost instantaneously. He must note the current speed, reveal the nature of its change (growth or reduction), select the reference acceleration



and make a tentative decision on the initial deflection of the controls. This is an entire complex of aerodynamic problems. Quite simple, of course, but on the condition that the pilot has unlimited time for this analysis, that he is not within range of an opponent who would invariably capitalize on any mistake and the slightest error, that problems having to do with completely different areas (chiefly tactical problems) do not intrude into the consciousness, or that the price of the slightest mistake is commensurate with the value of the result of combat. We can list many such conditions. This means that a simple knowledge of the dynamics of the airplane is obviously not enough for effective exploitation of "aerodynamic potential." The pilot needs to immerse himself into the nature of the maneuvering of which the aircraft system is capable.

There is another thing that must be considered: In the course of his combat training, the airplane the pilot engages in combat is at least a Soviet aircraft, if not the same type of aircraft, and the pilot has the opportunity to learn all of its subtleties. It is another situation when the air warrior engages a foreign airplane. The professional aviator knows a great deal about it as well. A great deal, but not all!

This brings up another problem.

It stands to reason that it was not our objective to completely analyze all problems of piloting in aerial combat; moreover this would be beyond the possibilities of a practical pilot. And then the literature devoted to piloting problems is meager in regard to this question. Therefore pilots extract personal experience directly from their flying. To the extent that their understanding and their powers of observation allow, at their own risk.

From the point of view of the practicing pilot the urgency of this problem elicits no doubts. As long as scientists remain silent, I will attempt to propose, for discussion by flight crews and under the fire of criticism from theoreticians, that which I have come up with in the course of flying and analyzing my own flying experience and that of other air warriors. For this purpose let me briefly formulate some of the rules of piloting in aerial combat (see below).

Whenever one tackles something complex and important, one desires to read one's opponents, to hear their arguments. I can already hear their uncompromising condemnations: "How can you possibly say that piloting in combat can require only sporadic distraction from the process of airplane control?!", "What is this nonsense about piloting in reaction to the opponent?", "What sort of sensations could be used to evaluate motion parameters and, all the more so, narrowing of the field of vision?".

These are serious objections. But I am convinced that piloting in aerial combat is a qualitatively new professional ability, without which the world's best aerobatic pilot would be helpless in an engagement with an adversary knowing how to fly in the new way.

Some Rules of Piloting in Aerial Combat

The pilot gathers flight information from nontraditional sources: from isolated, episodically recognized and approximately evaluated elements of the environment in their relationship to the maneuvering airplane, and most often in relation to the opponent's airplane and the pilot's own movement relative to him.

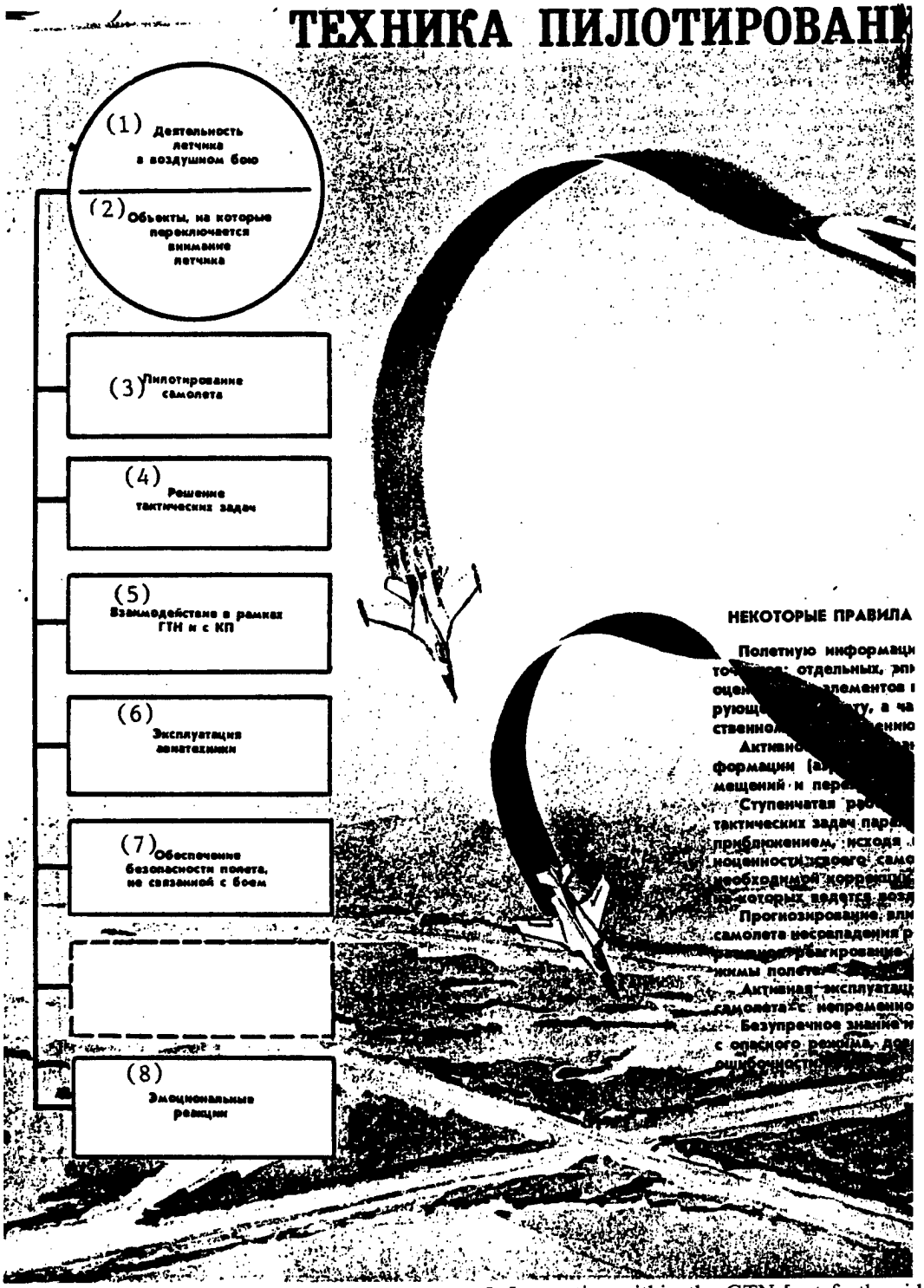
Active utilization of diverse noninstrumental information (aerodynamic shaking, vibrations, sensations of motions and accelerations, possible narrowing of the visual field etc.).

The stepped operation of the controls, establishment of the airplane motion parameters required for tactical missions by successive approximation, on the basis of the principle of approximately equivalent maneuvering of one's own airplane and the opponent's craft, or with regard for the required correction for the difference in flying properties of the airplanes engaged in aerial combat.

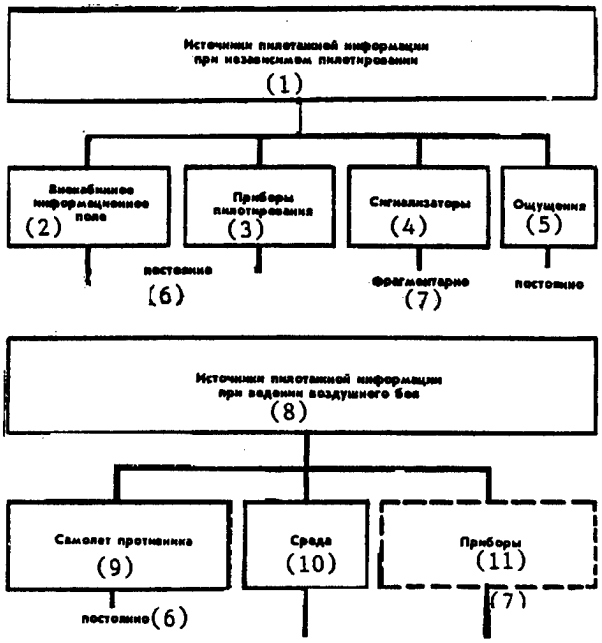
Prediction of the influence of the motion parameters of one's own airplane on the difference in the actual trajectories of oneself and the opponent; efficient reaction to the possibility of entering into dangerous flight conditions.

Active exploitation of developed airplane piloting habits coupled with mandatory critical assessment of each action.

Faultless knowledge and confident actions to immediately recover from dangerous conditions, rehearsed until they are automatic and absolutely error-free.



Key:
1. Pilot activity in aerial combat
2. Objects to which pilot switches attention
3. Airplane piloting
4. Carrying out technical missions
5. Interacting within the GTN [not further identified] and with command post
6. Operating aircraft equipment
7. Ensuring safety of flight not involving combat
8. Emotional reactions



Key:
1. Piloting information sources during independent piloting
2. Information field outside cockpit
3. Piloting instruments
4. Warning lights
5. Sensations
6. Constant
7. Fragmentary
8. Piloting information sources during aerial combat
9. Opponent's airplane
10. Environment
11. Instruments

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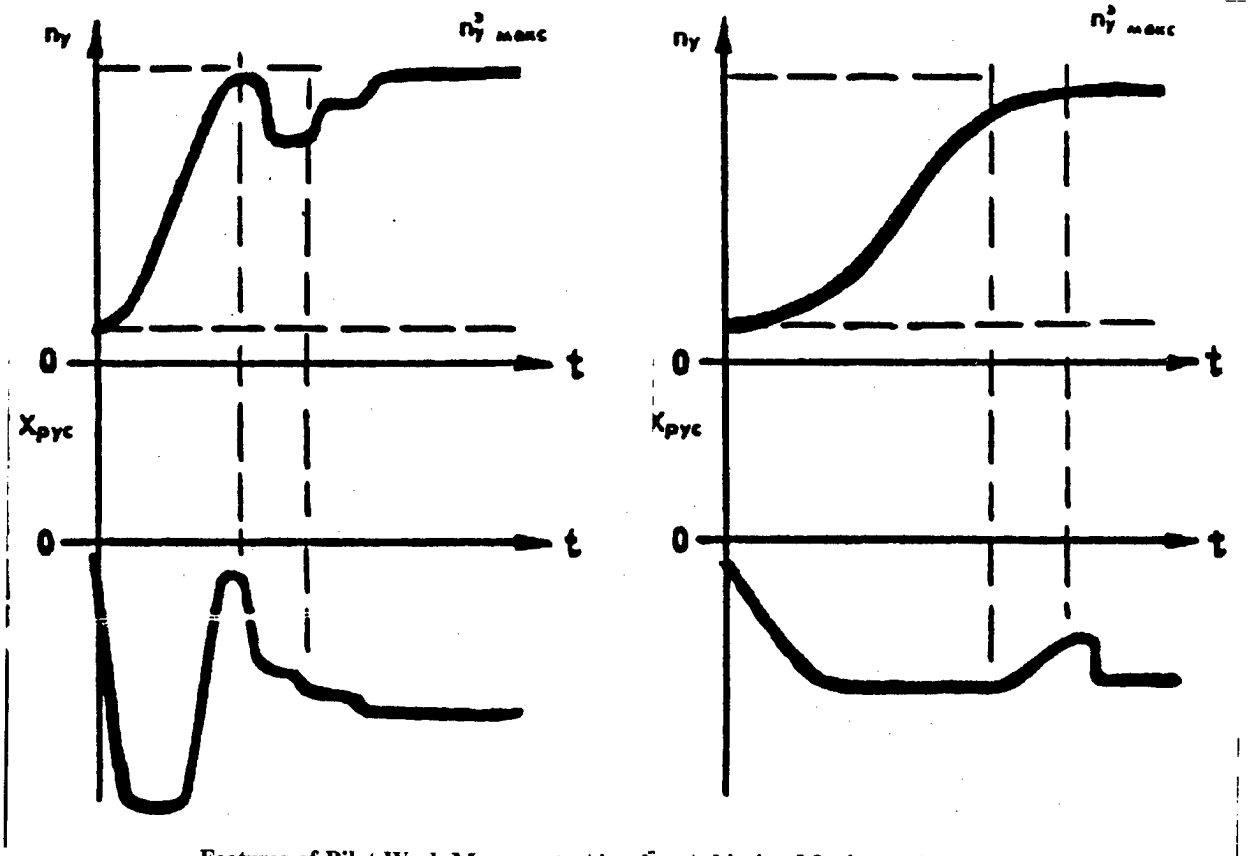

Features of Pilot Work Movements Aimed at Achieving Maximum Acceleration.

Key:
In aerial combat
When piloting

Along the Perestroika Course: Squadron Commander Recognizes Flaws in His Leadership Skills

91440070j Moscow AVIATSIYA I KOSMONAVTIKA in Russian
No 4, Apr 88 (signed to press 5 Mar 88) pp 28-29

[Article by Maj A. Zhilin: "Discord"]

[Text] Two red flares shot up into the sky: The tactical flying exercise had come to an end. Squadron commander Lieutenant Colonel Ya. Bondar, who had just taxied over to the parking apron, raised the canopy but was in no hurry to step down to the concrete. He wanted a little time alone, to compose his thoughts, to deaden the intense feelings that had been pursuing him recently. But on seeing the regiment commander leaving the control tower, he climbed down the ladder and marched quickly toward him.

"Comrade Colonel, 1st Squadron's tactical flying exercise is finished. All missions were carried out."

"So I've learned," the commander uttered in a friendly tone, his lips curled into a smile. "The squadron did well. And your own final sortie was like an exclamation mark at the end of a message telling of successful military work. Congratulations!"

Shaking Bondar's hand, he looked him in the eye and calmly asked him:"What do you think about the exercise results, Yaroslav Nikonovich, are they the consequence of changes in the collective, or did you have to resort to commander's 'doping' once again?"

Lieutenant Colonel Bondar stared right back, and answered slowly, weighing every word:

"I'm not going to say that a complete turning point has occurred in the squadron's affairs. It's too early. I can't guarantee that even I would be able to stay on course in the near future. It's hard. But I promise that I will try to stay on it. As far as 'doping' is concerned," the squadron commander fell silent for a few seconds, "I'm not going to try to hide anything: There was some of that as well. It was a little different this time, though. It did not evoke negative reactions in my subordinates."

"Thank you for your honesty," the regiment commander smiled once again, but even more broadly and sincerely. "I'm not going to keep you, all the more so because Major Khromchenko is waiting for you."

As Bondar walked to the classroom in which the flight crews had convened, he could clearly feel the anxiety, the doubt and the bias toward the difficult change in his activity, which he had accomplished by changing himself, dissolve in his soul. He walked, and his thoughts turned to the feeling that this was perhaps the first time recently that he sensed true joy for high results.

It was of course a pleasant thing to hear words of praise from his chiefs in former times. But they were perceived as nothing special. They paled in the face of the opinion rooted in his consciousness that things could not be otherwise, that he, a one-man commander, was holding the reins of the collective so firmly that their slightest movement would be sufficient to make his subordinates instantly carry out his wishes. This confidence unwittingly transformed into self-confidence. His faith in his own infallibility was reinforced by the fact that his forceful style of leadership produced what were generally substantial results: The squadron was deemed outstanding for 2 years in succession. Without noticing what was happening, the squadron commander began substituting a commander's good thinking by his own whims, principles by ambition, and exactingness by dictate at an increasing frequency. Then something happened which was going to happen sooner or later, inasmuch as the collective consisted not of submissive puppets but of living people with their own opinions.

...Some time ago the squadron was undergoing an exercise to test the results of the year's work, and suddenly there was a string of mistakes. And not by lieutenants, but by top-class pilots!

The squadron commander, who was at the command dispatching point, listened to the radio traffic between the officer in charge of flying and the crews. The reports were not encouraging. Majors A. Fomin and V. Borodov and captains S. Mikhaylenko and V. Trotsyuk were unable to earn more than a satisfactory grade at the practice range.

Lieutenant Colonel P. Timofeyev, who was the officer in charge of flying for this exercise, turned to Bondar:

"The second sortie was worse than the first. You'll barely scrape by with a good grade, even if everyone gets excellent scores in the third sortie."

Irritated by the failure, the squadron commander turned abruptly and went outside. From the command dispatching point he headed for the preflight briefing room. He stepped up his pace as the indignation rose in his soul. As he approached the door he heard the voice of his deputy, Major V. Khromchenko. Addressing the pilots, he said:

"If we don't get it together, our failure is going to be complete. And that kind of result simply doesn't fit with everything else. Remember how much energy we invested into completing the training year successfully; don't you care if all of your work leads to nowhere?"

"It doesn't have anything to do with not caring about our work," someone answered. "It's that our strength has its limits. How much urging can we take, how long can we be forced to run one marathon after another without a breather? We put so much into the race that we don't have enough strength left for the final sprint."

"Let's assume you're right. But what do we do to save our pledges, to make our work worth it? That's what we need to think about. We can talk about the way the work was planned and about the crash campaigns after the tactical flying exercise. That's a promise," Khromchenko said.

"There he goes again, playing the demagogue," the squadron commander thought dejectedly. "He's taken on quite a lot. He sticks his nose into everything with his advice. He doesn't like this, he doesn't like that. Could it be he's lusting for the commander's chair?"

He didn't like Major Khromchenko right from the start. The major joined the squadron as a replacement from the group of forces. He was disciplined and honorable. Bondar did not have any complaints about his work. He carried out all instructions quickly and competently. It was evident that he had achieved a high level of professional training. What he didn't like most of all was his deputy's habit of always stating his opinion, though he did do so with consideration and tact.

The lieutenant colonel decisively entered the classroom. The pilots snapped to attention. Giving them a hard look, the squadron commander emphasized every word as he spoke:

"I hope everyone understands that the last sortie will determine the result of our work. I'm not going to urge anyone now. Those who are making mistakes, let them police themselves. The 'rewards' you'll get after the exercise will be generous, no doubt about it. But for now, get to your airplanes, it's exercise time!"

The pilots silently moved toward the parking apron with downcast eyes.

"Wait a second, Aleksandr Mikhaylovich," Bondar called to his deputy for political affairs, Major Anisimov. After everyone left the classroom, he spoke coldly: "What am I supposed to do, persuade them all on my own? I have plenty of other things to do. Make sure that every pilot, engineer and technician knows that if we fail, everyone is going to suffer not only at work but also in party status. Urge them to be responsible, responsible.... Do you understand me?"

"I understand, Yaroslav Nikonovich. I'll try. I'll see that everyone gets a shot in the arm," the major readily answered.

The squadron commander liked Anisimov. He knew intuitively what the commander wanted, and he tackled his assigned work without too many questions. But most importantly he knew his place, he did not butt into the commander's work. This is why the squadron commander made it a point to show him attention: Whenever the opportunity arose he expressed his thanks to him.

The missile carriers took off in response to a signal from the command post. Crossing the simulated front line, they attained the target area. Deputy squadron commander Major V. Khromchenko, the leader of the second pair, discovered the first "enemy" tank. He transmitted the coordinates and the landmarks by radio.

The missile carriers went into the attack one after another. Smoke from the explosions blanketed the practice range. Bondar was unable to see how accurately the crews following him were bombing and firing. On completing his antiaircraft maneuver he assumed a course back to the airfield.

A thought pursued him relentlessly: "Are we really not going to be able to save the situation? I just hope that none of the pilots gets an unsatisfactory score." There was a spark of hope in him, though he knew subconsciously that in the tense situation, few could achieve a high score.

And so it came to pass. When the airplanes returned to the airfield, it was reported from the practice range that the average point score for combat use in the squadron's third sortie was four and two-tenths. This meant that the subunit had completed the tasks of the tactical flying exercise with not more than a satisfactory grade.

A dark cloud hung over the regiment commander's head at the flight critique. He listened silently to the reports of the officials, jotting notes down in his notebook. The liaison officer from higher headquarters was no less gloomy. Bondar knew that the lightning was going to strike hard, and therefore, analyzing the actions of his subordinates, he tried to defuse the situation to some extent. As luck would have it, the thunder and lightning passed by the wayside.

Following the critique the regiment commander let the personnel go to rest up, telling Lieutenant Colonel Bondar and his deputies to see him in the morning.

At the appointed time the squadron commander and majors Khromchenko and Anisimov were in the office. The regiment commander and the liaison officer from higher headquarters were already there. Bondar felt a shiver run up his spine. In the time that the squadron maintained its outstanding title he had become accustomed to playing the role of victor after exercises. This "immunity" is perhaps what confirmed in himself the notion that any means would justify a high result. But was this really so?

"Comrade Lieutenant Colonel," the regiment commander's tone was emphatically official, "what is your appraisal of yesterday's failure?"

"A disappointment. We were unable to arouse the people for the mission in time."

"Are you saying that this was just bad luck?"

"Yes, I think so. And it will not happen again," the squadron commander tried to respond as confidently as he could.

"Let's hope that the situation can be corrected," the commander softened a little.

Major Khromchenko got up.

"Permission to speak? If we write off the failure as bad luck, things could be even worse the next time. Yesterday's failure was waiting to happen. It was a consequence of the fact that the collective was morally overstrained by the forced effort to catch up due to mistakes in planning. You can't fly long on afterburners, you know. The people were burned out by the constant tension, the endless urging. And each one of us here is guilty of this." He tactfully deflected his blow from the squadron commander.

"Well, here's what I think." The liaison officer from higher headquarters rose to his feet. "First you need to work things out between yourselves, comrade leaders, determine who needs to do what, and then we'll talk about it more thoroughly. Dismissed!"

They walked silently to the squadron administration building. Entering his office, the squadron commander shut the door firmly and turned to Major Khromchenko:

"You haven't been in this squadron long, Viktor Ivanovich. You need not set yourself up as a prophet. The squadron was outstanding before you came, and it will be outstanding when you're gone. In the future I ask you to keep your opinions to yourself. I'm responsible for the collective. And that means it's my business to decide who is to do what."

"You've cast a shadow on the entire collective for no good reason!" Major Anisimov supported the commander. "What you did was slander."

They spent a rather long time "educating" Major Khromchenko, trying to suggest to him that he should not be so pushy with his ideas, that they did not need any kind of innovations, that they had lived without them before, and they would sort things out somehow. Exhausted from their "moralizing," they fell silent. Khromchenko remained silent as well. Then he calmly uttered:

"Let me make things clear right now. I've been around the squadron long enough. I've been able to figure some things out. I'm not lusting for the commander's job. And the last thing I would want to do is darken the reputation of the collective in which I serve. But when it comes to my ideas on what to do next," Khromchenko paused, searching for the most appropriate words, "no one has the right to bar me, a communist, from expressing them. You, Yaroslav Nikonovich, did not like the fact that I stated my point of view to the regiment commander. Haven't you and I already talked on this subject? And more than once! And always without any results. I would hope that changes would occur. We need them as much as air itself."

"What kind of changes? In what direction?"

"People doubt that changes are possible in our squadron," Khromchenko continued. "The principle of working harder and longer proved itself wrong long ago! And here we are, trying to fit it to new slogans. Don't you think it's about time to stop urging the men to run themselves ragged, to drop from working from dawn to dusk, without any days off, holding combat readiness up as an excuse? Combat readiness depends not on the number of hours the personnel spend in the classrooms or at the parking apron, but rather on how effectively every training hour is utilized. Our plans are drawn up not so much with an eye on training quality as on quantity."

"What do you suggest specifically?" Bondar asked, abandoning his confrontational tone.

"Openly and honestly talking about the evolved situation at a party meeting. I'm certain many things will come clear in this way."

And so it was decided.

Lieutenant Colonel Bondar sequestered himself in his office after the party meeting. One gloomy thought after another pressed upon him. The faces of communists A. Yeremin, D. Lukyanov, L. Kalinkin and other speakers paraded before his mind. They had spoken openly, and sometimes with brutal directness. And always about the current situation, one that could no longer be tolerated.

Bondar pondered what was said, and it became ever clearer to him that his former ideas about his style and methods of work with people were sometimes wrong. He got the mistaken notion that he knew his subordinates well. True, he knew what the paperwork said about them. But not the souls of the people. They were not blind executors of the commander's will. Each was a generator of ideas. And each desired to be heard, understood and supported.

Then he suddenly realized that he felt uncomfortable before Khromchenko during the meeting. Khromchenko's directness and self-confidence kept him from recognizing his deputy to be a person who was really concerned about the way things were going. And this is probably why he perceived his deputy's adherence to principles as careerism. Moreover Khromchenko, who had experienced excellent combat training in the Group of Soviet Forces in Germany, did have the moral right to influence the training process both as an executive and as a communist.

Thinking about himself, and about the people in the squadron, he came to this conclusion: If he was in fact the leader of his subordinates in the air, he had distanced himself from them on the ground. How did it happen that everything that seemed so stable collapsed in an instant? He was not after all the "inventor" of volitional and administrative methods of leadership: This was the way he was led in his student years, and this was the way the future commander was taught to act. Thus when he assumed the helm of the collective, he assumed the wrong course, failing to make the correction for the

human factor, for the consciousness of people, as discussed at the 27th CPSU Congress. Now the situation needed to be corrected. But where to begin?"

"Wait a minute!" Bondar interrupted his line of reasoning, and thought: "Again I'm going about it in the old way: I'm trying to solve all the problems by myself. What about the things that communists said at the meeting? There was no lack of proposals there...."

Returning from these thoughts of the past, Lieutenant Colonel Bondar met Major Khromchenko in the hallway. Flashing a friendly smile, Khromchenko said: "We sure got our 'enemy' good. While you were in the air the rumor went around that after our exercise the practice range will be closed for overhaul—we burnt up all of the targets." Viktor Ivanovich pulled out a sheet of paper and stretched it out to the squadron commander. "These are the ones that did the best. I've checked the list over with members of the party buro. I think you might find this information useful in the flight critique."

Taking the sheet, Yaroslav Nikonovich thought: "My deputy is always looking ahead. He's a good one! With such a helper, I don't think you can ever go wrong...."

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Flight Safety: Advice From a Specialist; Helicopter in a Dive

91440070k Moscow AVIATSIYA I KOSMONAVTIKA in Russian
No 4, Apr 88 (signed to press 5 Mar 88) pp 32-33

[Article by Lt Col N. Kompaniyets, Maj V. Simonenko, candidate of technical sciences and Major I. Derevyanko: "The Helicopter in a Dive"]

[Text] The experience of helicopter operation shows that when flight constraints set for diving conditions are not observed, the main rotor blades may come in contact with structural elements of the front portion of the fuselage, and chiefly with the engine cowlings, near their intakes. And although this phenomenon is encountered extremely rarely and it is impermissible for maneuvering helicopters, nonetheless the interests of flight safety require that every crew know the way the blades behave above the helicopter cabin in diving conditions when for one reason or another the established flight constraints and the limitations on controlling actions are exceeded.

The most probable cause of a dangerous situation when committing to a dive and in its course may be exceeding the helicopter flying speed and pitch angle constraints established by instructions to the crew, and shifting the control stick to its far forward position while simultaneously or subsequently reducing the blade angle (the overall pitch).

In order to gain a fuller understanding of the physical essence of this phenomenon, some typical features of the work of helicopter main rotor blades performing pendulum movements relative to a horizontal articulation are presented below. The forces acting on a main rotor blade are diagrammed in Figure 1.

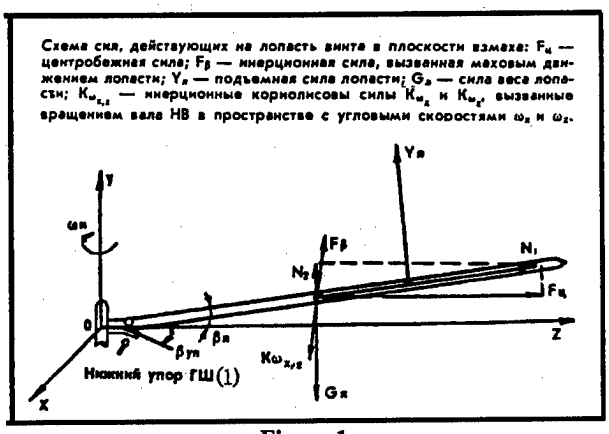

Figure 1

Key:
1. Lower stop of horizontal articulation

Under normal flying conditions the main rotor's blades make periodic oscillatory movements with an amplitude on the order of 10- 15° without touching the upper and lower stops. The permissible range of oscillations for an Mi-8 helicopter is 29- 30° (the downward stroke is limited by the lower stop of the horizontal articulation to -4°, while the upper stroke is limited by the upper stop of the horizontal articulation to 25°).

Flexible bending deformations of the blades are small, because the component of centrifugal force N_1 stretching the blade is approximately 20 times greater than the aerodynamic and mass (inertial) forces acting on the blade. In the case of the blades of an Mi-8 helicopter in sustained horizontal flight, N_1 is approximately 344 kN (35 tons), while the sum of the aerodynamic and mass forces around 20 kN (2 tons). Calculations and tests show that in this case the flexing stresses in the blade spar are several times lower than the maximum permissible out of strength considerations.

A somewhat different pattern is observed when the blades strike one of the stops, and particularly the lower stop of the horizontal articulation. Were the blade absolutely rigid, the angle of its stroke would be equal to the angle of the lower stop of the horizontal articulation, and in this case downward pendulum motion would stop right there. But because the blade has some flexibility, it would continue its downward movement, though now rigidly pinched at its base, which would result in significant growth of flexing stresses in its base sections. In this case the greater the angular velocity of the blade at the moment it strikes the stop, the larger the stroke angle would be.

A group of specialists working under the guidance of Colonel B. Loktev, a professor and doctor of technical sciences, carried out research on the nature of motion of the blades of an Mi-8 helicopter when the established contraints are exceeded. Theoretical solution of this problem required use of a rather complex mathematical model that could be realized only with modern high-speed computers. The calculation method was based on the discrete vortex method, which has proven itself so well in research on the aerodynamics and aerial elasticity of aircraft and their supporting parts.

Helicopter motion was modeled under diving conditions at a speed of 300 km/hr; the rotor's angle of attack was α_H=- 18°, the wobble plate was tilted forward 6°, and the helicopter's pitch angular velocity was ω_z=- 6°C. These parameters were kept constant as the blade angles were varied within the range φ_0=1.5°- 6° (where φ_0 is the angle at which the main rotor blade section is set, with the relative radius being r=0.7). As an example Figure 2 shows the pattern of change of the blade stroke angle relative to the horizontal articulation in relation to the angle of its azimuth position when φ_0=6°. It reveals that the blade performs a pendulum motion with an average stroke angle of β_{gp}=-6.3°. The lowest value of β_{gp} occurs at a blade azimuth Ψ_{gp}=180°—that is, the moment it is over the cabin. As is evident from Figure 3, in this case the blade is close to the cowlings of the helicopter engines, but it is not yet touching them. As $\varphi_0$decreases, the blade drops even further down, and when φ_0 is less than 5°, it strikes the cowlings. Also typical of these flight conditions is the fact that when φ_0 is less than 5°, the blade comes in contact with the lower stop of the horizontal articulation and begins to act as if it were rigidly pinched at its base (Figure 4). This causes growth of flexing stresses in the blade spar to an amount exceeding the maximum permissible value (it is 350 MPa for the blade spar of an Mi-8 helicopter pressed out of aluminum alloy). This in turn leads to disintegration of the blade, which can occur prior to the moment it strikes the engine cowlings.

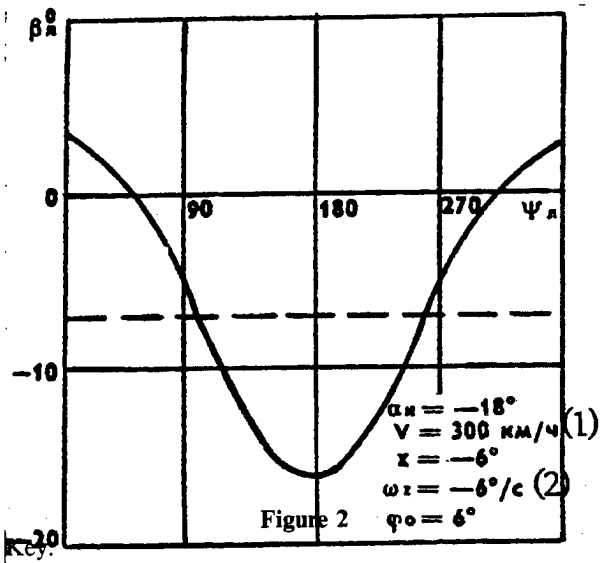

Figure 2

Рис. 2.

Key:
1. km/hr
2. sec

It follows from the above that main rotor blades come dangerously close to elements of the front portion of the fuselage of a helicopter only if the flight crew violates the prescribed constraints on helicopter flying speed and pitch angle during a dive, coupled with shifting the control stick to its far forward position and creation of a negative pitch angular velocity greater than 5°/sec.

It should be remembered that in this situation it would be extremely undesirable to reduce the angle at which the main rotor blades are set as a means of keeping them from striking the stops, owing to the possibility that the blades would then strike elements of the front portion of the fuselage. Recovery from a dive is effected in this case by smoothly shifting the control stick toward the body without decreasing the blade angle below 5°. The flight crew must know that reducing the overall pitch of the helicopter below 5° in the presence of high diving parameters (a velocity greater than 250 km/hr and a pitch angle of 30°) is dangerous due to possible contact of the main rotor blades with engine cowlings. The crew must always remember that it is impermissible to exceed the flight constraints, and particularly in regard to the parameters examined here.

11004

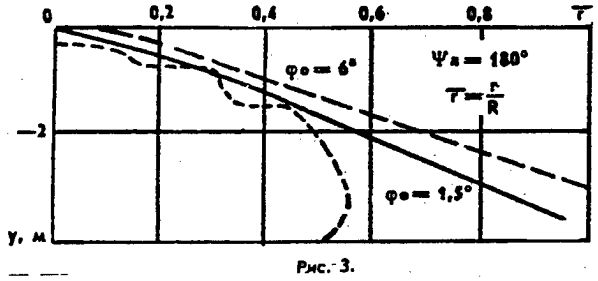

Рис. 3.

Figure 3

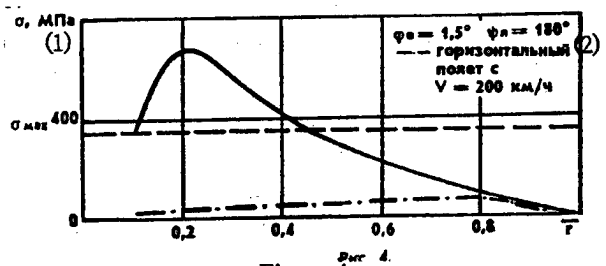

Рис. 4.

Figure 4

Key:
1. MPa
2. Horizontal flgiht with V=200 km/hr

Decorated Attack Pilot's Career Profiled: The Motherland Rewarded Them

91440070l Moscow AVIATSIYA I KOSMONAVTIKA in Russian
No 4, Apr 88 (signed to press 5 Mar 88) pp 34-35

[Article by Col V. Lebedev: "Four Hundred Fifteen Combat Sorties"]

[Text] This figure was not pulled out of thin air. It can be found in the flight log belonging to Senior Lieutenant V. Goncharenko, a valiant air warrior and a cavalier of the orders of the Red Star and "For Service to the Motherland in the USSR Armed Forces," 3d Degree.

And late last year the pilot was presented with the country's highest award. Comrade A. A. Gromyko, chairman of the Presidium of the USSR Supreme Soviet, said at that time: "...the motherland honors Hero of the Soviet Union Vladislav Fedorovich Goncharenko, and in his guise our soldier-internationalists in Afghanistan, who serve as an example of courage, valor and heroism. I would like to turn your attention, comrades, to the fact that this is the 67th Hero of the Soviet Union who received the motherland's highest combat decoration for heroism when rendering assistance to a fraternal country.... Everything our soldiers do to render assistance to a fraternal people is an act of heroism. Their military labor will contribute a brilliant page to the chronicle of the Soviet Army and to the history of Soviet-Afghan relations."

Senior Lieutenant Goncharenko listened to these words with agitation. He was proud that together with his comrades-in-arms he honorably withstood a severe trial and justified the trust of the party and the people. That day persons known to the entire country as recipients of the Hero of Socialist Labor title had convened in the hall of the ancient Kremlin. They were older than him, wisened by life's experiences. But the first Order of Lenin and Gold Star of a Hero of the Soviet Union went to him, a 25-year-old pilot who successfully mastered flying a modern airplane, a representative of a new generation of our glorious armed forces.

This generation was born in the late 1950s and early 1960s. The consciousness and character of today's young aviators were formed in the family, in school and in the air force's institutions of higher military education, on the basis of the heroic traditions of the Soviet Armed Forces.

Goncharenko grew up in Poltava in a working family. His father is a foundry hand, and his mother works in a clothing association. Vladislav loved his city, its beautiful squares and green streets. He had a good knowledge of its history and its architectural monuments erected back in the 17th and 18th centuries. As a young boy he frequented the square in which stands the grand Column of Glory, fashioned from bronze and granite.

He spent long summer days by the Vorskla River. From its picturesque bank he watched the slow movement of the puffy snow-white clouds. He studied the behavior of the swift sharp-eyed gulls. They would soar over the mirror stillness of the river, and on spying their prey, they would shoot down like lightning, seize it, and once again climb into the sky.

Goncharenko wanted to be a pilot ever since he was a child. He did excellently in his school work, and he spent a great deal of time in the gymnasium—he was interested in wrestling. He played soccer and hockey. He eagerly built airplane models in the aviation club.

Once on the bank of the Vorskla Vladislav met one of his school friends who had received his certificate of maturity the year before. He was wearing a cadet's uniform.

"What are you doing now?" Goncharenko asked his friend.

"I'm studying in the pilot school at Borisoglebsk," the cadet proudly replied.

"I'm happy for you. Tell me how you got in."

His friend told an interesting story. His enthusiasm inspired Vladislav. It was then that he made the firm decision to go into military aviation. At first his parents objected, but later on they came to understand that there was no use in trying to persuade their son to change his mind.

Some time later Vladislav Goncharenko was admitted to the Borisoglebsk Higher Military Aviation School for Pilots imeni V. P. Chkalov. He did well in his exams. The doctors discovered no deviations in the young man's health. Their opinion was unanimous: He was fit for flying without restrictions.

Later on life would confirm that he belonged to that category of willful, decisive and resourceful people who, once having made their choice, remain faithful to their profession forever. And the harder and more risky it is and the harder work it requires, as a rule the more firmly they become attached to it.

Cadet Goncharenko heard about the valor and courage of graduates of the famous educational institution from the first days at the school. This school was founded in response to a personal directive from the V. I. Lenin. On 29 October 1923, on the anniversary of the birth of the Komsomol, the first class of air warriors graduated. Among them was the remarkable Soviet pilot V. Chkalov.

Defending the socialist fatherland, the school's graduates demonstrated high flying proficiency and displayed mass heroism. Many of them distinguished themselves in aerial combat against Japanese militarists by Lake Khasan and the Halhin Gol River, and in the skies of republican Spain and China.

A. Blagoveshchenskiy, A. Vitruk, S. Goryunov, N. Kamanin, I. Mazuruk, F. Polynin, V. Kholzunov, A. Yumashev and other graduates of the school fought the enemy courageously during the Great Patriotic War. In the menacing days of August 1941 Komsomol member V. Talalikhin was the first to ram the enemy at night over the skies of Moscow. Fighter pilot L. Belousov, who lost both of his legs, continued to fly into combat wearing artificial limbs, and in his aerial engagements he annihilated another several fascist airplanes. A. Alelyukhin and P. Kamozin knocked down 40 enemy craft each during the war.

Around 300 graduates of the Borisoglebsk Higher Military Aviation School for Pilots have become heroes of the Soviet Union, and 12 of the best were awarded this title twice.

The school is proud that its graduates include test pilots known throughout the country—twice-awarded Hero of the Soviet Union V. Kokkinaki, heroes of the Soviet Union Yu. Alasheyev, O. Gudkov, E. Yelyan, A. Kazakov and V. Smirnov, and others.

At the school, Cadet Goncharenko developed as a military man and mastered the complex pilot's profession. The way of life at the school itself affected him. Vladislav acquired flying skills and developed the traits of character needed of an air warrior. Self-control and the ability to present his thoughts with an economy of words, to react quickly to a situation, to make independent decisions and to competently implement them appeared in his character.

Learning the military pilot's profession, Goncharenko clearly understood that service in the armed forces imposes many specific requirements on the individual, and that it promotes acquisition of valuable qualities which can be obtained nowhere but in the army. He heard many times from his instructors that flying is not only physical effort but also intense intellectual activity in the presence of a strict time limit and a high pace of actions. He himself was persuaded daily that it is impossible to become a pilot without acquiring enormous endurance and instantaneous reaction, without knowing how to distribute attention and effort properly while in flight.

In his first 2 years he got used to the sky aboard an L-29, and the next 2 years in a MiG-21. He graduated from the school with honors, receiving a red diploma.

He returned to his Poltava with the rank of lieutenant, appearing before his happy parents in his flight uniform, erect, smart and handsome. His mother and father noticed the changes that had occurred in their son. He was now a fully developed individual, with a complete character, volitional, purposeful and courageous.

"I had right of choice," Vladislav Fedorovich told us. "Therefore I asked for the Red Banner Odessa Military District. I knew that the air regiment was going to receive new equipment. Several people went there from our school: Sasha Baranov, Sergey Gritskevich, Aleksandr Koshkin, Sergey Sitnikov, Vadim Yankov and others. And 2 years after graduating, all were sent to the Republic of Afghanistan. And prior to this we had to assimilate the new equipment—a modern attack aircraft. Much of my experience is associated with this airplane."

We all know how coolly and courageously the crews of the legendary Il-2s fought over the battlefields of the Great Patriotic War, making stunning strikes against enemy troops. Many times they were thanked by motorized riflemen, gunners and tankmen for effective support from the air during penetration of enemy defenses, and for destruction of fascist columns.

"We had to work hard to assimilate this complex weapon system. And we tried as hard as we could," Vladislav Fedorovich recalled those times.

He had warm things to say about his squadron commander, Lieutenant Colonel S. Glukhov, and his flight commander, Captain S. Kharchenko.

"But we, the young pilots, are especially grateful to sniper pilot Aleksandr Vladimirovich Rutskoy. He concerned himself thoughtfully with our development. Within short time all of us became 3d class pilots, and a little while later my class qualification was raised."

Senior Lieutenant Goncharenko described memorable events, fellow workers, comrades and mentors. He asked a favor:

"Please help me find out where Rutskoy is serving now. He did a great deal for me. He's a strict, demanding, strong pilot. I am sincerely grateful to him."

One can feel that the senior lieutenant had great respect for his former commander.

Recent graduates of the Borisoglebsk School were sent under Communist Rutskoy's command to the Republic of Afghanistan in fall 1985 within the composition of the limited contingent of Soviet troops, but not all of them returned to the motherland. Aleksandr Baranov failed to return one dark night from his combat assignment.

Every sortie was a severe trial to the ground attack crews. They were the first to go out on air reconnaissance. Without any landmarks, under the cover of the dark night, they determined the locations of dushman bands, of their fire positions skillfully concealed in mountains and ravines, and of weapon and ammunition stockpiles. And on discovering them, they destroyed them with accurate fire, making things easier for Afghan and our subunits on the ground. They also had to fly sorties to neutralize antiaircraft resources.

Once Senior Lieutenant Goncharenko flew as Rutskoy's follower. It all happened unexpectedly: The flight commander had fallen ill suddenly. It was just then that the command post received instructions to find and neutralize dushman fire positions.

Rutskoy came to the airfield and found Goncharenko.

"Get ready to take off," he ordered. "The airplanes are ready. You're pairing up with me."

They took off for their assignment at 0200 hours. They reached the designated area. Not a single light could be seen below, it was quiet as a graveyard: The dushman were waiting with bated breath. The leader headed straight for the ground while his follower observed his actions from above. Rutskoy sped over the dushman positions at low altitude. Their nerves could not endure this. Large-caliber machineguns came alive. Streaks of fire cut the night sky.

The bandits opened fire with all types of weapons. The fire storm raged all around. Our pilots revealed about 60 fire positions in that sortie.

But their work did not end with this. Lightning strikes followed. The first, the second, the third. First the commander, and then his follower, hurled their menacing aircraft down toward the hot lead. In such a situation all hopes rested on endurance, initiative and high proficiency. Finally a new group of airplanes approached. They completed the work started by Rutskoy and Goncharenko. You can imagine how grateful the motorized riflemen and tankmen were later on to the pilots!

Such is the way it was almost every day or night. One sortie after another. This might not seem like anything special. But imagine what exertion of physical and moral strength these times required of the flight crews, engineers and technicians!

All 415 sorties flown by Communist Goncharenko in the skies of Afghanistan were combat sorties. Each of them was unrepeatable.

"We flew over very many provinces of Afghanistan," Vladislav Fedorovich shared some of his experiences.

He recalled one night when he took off on a reconnaissance mission with Vadim Yankov: They had to establish the movements of a dushman band and its combat organization.

Worse weather could not be imagined. An inpenetrable haze hid the ground.

"But even in the dark we were able to quickly discover the rebels," Goncharenko said. "However, we were prohibited from attacking the revealed targets. We returned to the airfield with a wealth of information. At dawn the crews took off to destroy the discovered targets. They did so brilliantly."

Vladislav Fedorovich recalled another sortie. Our scouts had discovered a caravan on the Khost-Gardez road.

"We were given the coordinates," Goncharenko said. "We took off as a flight. We reached our designated area quickly. And there we saw the dushman column. Yankov was my follower. I made a bomb strike on the motor vehicles while he struck the caravan. We made several passes. As we left the area of dushman concentration we noticed two buildings, and a few motor vehicles not far from them. But we had expended all of our ammunition.

"Returning, we reported to the command post that we had completed our mission and asked the command to allow us to fly back into the area.

"During our hasty lunch specialists of the squadron's air force engineer service headed by Communist Milanov managed to prepare the airplanes.

" 'The O.K. for the sortie has been given,' the command post reported.

"Without delay we climbed into the cockpits of our aircraft. We started our engines and took off."

When the pilots returned to their former place of "work" everything was astir. The bombs and rockets did their job. A large ammunition dump was destroyed. The explosion took the roofs off the two surviving buildings. But the motor vehicles were no longer there.

"Let's follow the road and see what there is. The dushman could not have gone very far," Goncharenko transmitted to his follower.

A few minutes later they discovered four motor vehicles traveling a kilometer apart. They fired their rockets at them. The rockets made direct hits and destroyed all targets. Then they turned back and destroyed the two surviving buildings located not far from the dump where the dushman stored their weapons and ammunition.

"In this sortie I personally saw the tremendous amount of damage that the rebels suffered from just two units of rockets launched by a pair of our airplanes," said Senior Lieutenant Goncharenko. The most important thing is to learn how to use this complex equipment well, and to master modern tactics."

The practice range was visited one day by one of the leaders of the Republic of Afghanistan. The pilots showed him a new tactic that they had tested and developed in the course of combat missions. He gave a high assessment to our aviators and presented engraved watches to Lieutenant Colonel V. Vysotskiy, Captain V. Demchenko and senior lieutenants V. Goncharenko and S. Sitnikov.

To relax after the intense flying, Vladislav Fedorovich would pick up his guitar. His fingers would move lightly over the strings. The officer would sing his favorite songs. The aviators would gather around and sing along.

Once Goncharenko was offered a new post. He replied:

"I'll think about it."

A little while later he went up to his commander and said:

"It's tempting, of course. But I'm still too young. I'll wait."

Now Hero of the Soviet Union Vladislav Fedorovich Goncharenko is serving in the Red Banner Turkestan Military District, where he is transmitting his combat experience to fellow servicemen. Concurrently he is making ready to enter the military academy.

His younger brother Viktor, who graduates from secondary school this year, is also planning to join the air force. Who knows, perhaps service to the motherland in military aviation will become a lifetime pursuit for him as it did for Vladislav.

Recently Senior Lieutenant V. Goncharenko was promoted to the rank of captain.

11004

Table of Spacecraft Launchings in the USSR in 1987

91440070m Moscow AVIATSIYA I KOSMONAVTIKA in Russian
No 4, Apr 88 (signed to press 5 Mar 88) pp 40-41

[Text][1] Meteor-2—a satellite of a space meteorological system carrying instruments by which to obtain global images of cloud cover and the underlying surface in the visible and infrared spectra for both delayed and direct transmission, and by which to maintain continuous observation of the flow of penetrating radiation in near-earth space, and obtain global data on vertical temperature distribution (the first satellite was launched 11 July 1975). The satellite is equipped with an electromechanical triple-flywheel orientation and stabilization system.

[2] Kosmos—The name of a series of satellites that have been launched regularly (beginning on 16 March 1962) from cosmodromes in the Soviet Union. Their scientific research program foresees:

studying the concentration of charged particles in the ionosphere with the purpose of investigating propagation of radio waves, corpuscular flows and low-energy particles, the energy content of the earth's radiation belts with the purpose of evaluating the radioactive danger of lengthy space flights, the processes of adaptation to weightlessness, the primary composition of cosmic rays and variations in their intensity, the earth's magnetic field, shortwave radiation from the sun and other heavenly bodies, the upper layers of the atmosphere, and the effects of meteoric matter upon the structural elements of space objects;

conducting research and experiments in cosmic materials technology, conducting experiments to obtain semiconductor materials with improved properties and especially pure biological preparations in microgravity, studying the influence of space flight factors on living organisms, and conducting scientific-technical research and experiments in behalf of different sectors of the national economy and in programs of international cooperation, including in hydrology, cartography, geology, agriculture and environmental science;

perfecting the components and instrumentation of a space navigation system being created with the purpose of determining the locations of civilian aircraft and naval and fishing vessels, including ones in distress, experimental apparatus for relaying telegraph and telephone information, and equipment, machine units and structural components of satellites flying under different conditions, including in joint flights;

acquiring current information and continuing to perfect new types of information and measuring apparatus and methods for remote analysis of the earth's surface and atmosphere and the ocean in behalf of different sectors of the national economy, science and programs of international cooperation.

[3] Progress-27, -28, -29, -30, -31, -32, -33—automatic cargo ships. The purpose of launching them is to deliver expendable materials and various cargo to the Mir orbiting station.

[4] Molniya-3—communication satellite (the next updated version of the Molniya-1 and Molniya-2 communication satellites) intended to support operation of a long-distance telephone-telegraph radio communication system, and to transmit USSR Central Television programs to stations of the Orbita network and to support international cooperation (the first satellite was launched 21 November 1974). The satellite's onboard apparatus uses the centimeter frequency band.

[5]Soyuz TM—a modernized version of the Soyuz T manned spacecraft capable of carrying a 250 kg heavier payload. Yu. Romanenko and A. Laveykin—the second main expedition to the Mir complex—were launched in Soyuz TM-2. Soyuz TM-3 placed the Soviet-Syrian crew consisting of A. Viktorenko, A. Aleksandrov and M. Faris into orbit. After fulfilling their international program cosmonauts A. Viktorenko, A. Laveykin and M. Faris returned to earth. The duration of A. Laveykin's flight was 174 days, 3 hours, 26 minutes, while that of A. Viktorenko's and M. Faris's flight was 7 days, 23 hours, 5 minutes. Soyuz TM-4 delivered cosmonauts V. Titov, M. Manarov and A. Levchenko to the Mir complex. Following replacement of the crew of the second main expedition, V. Titov and M. Manarov are continuing the work aboard the orbiting complex. Yu. Romanenko, A. Aleksandrov and A. Levchenko

returned to earth aboard Soyuz TM-3. The duration of Yu. Romanenko's flight was 326 days, 11 hours, 38 minutes, that of A. Aleksandrov's flight was 160 days, 7 hours, 17 minutes, and that of A. Levchenko's flight was 7 days, 21 hours, 58 minutes.

[6] Raduga—communication satellite carrying relay apparatus intended to support telephone-telegraph communication and transmission of television programs. It is equipped with multichannel communication apparatus operating in the centimeter radio wave band (the first satellite was launched 22 December 1975).

[7]Kvant—specialized astrophysical module intended for a wide range of research in extra-atmospheric astronomy and for carrying out a number of other scientific and national economic tasks. This is the first of a series of specialized modules for the multipurpose Mir-Kvant-Soyuz TM permanent manned complex. [8] Gorizont—communication satellite supporting around-the-clock long- distance telephone-telegraph radio communication and transmission of television programs to stations of the Orbita and Moskva systems, as well as for use in the Intersputnik international satellite system (the first Gorizont satellite was launched 19 December 1978). It carries multichannel relay apparatus operating in the centimeter wavelength band.

[9] Ekran—television broadcasting satellite carrying relay apparatus supporting transmission of Central Television programs in the decimeter waveband to a network of shared receivers (the first Ekran satellite was launched 26 October 1976).

[10] Kosmos-1827—Kosmos-1832, Kosmos-1838—Kosmos-1840, Kosmos-1852—Kosmos- 1859, Kosmos 1875—Kosmos-1880, Kosmos-1883—Kosmos-1885 were all placed in orbit by the same launch vehicle.

On 15 May at 2130 hours Moscow time, the first general-purpose Energiya launch vehicle was launched from Baykonur Cosmodrome as part of a program of design and flight tests with a full-scale satellite mock-up.

11004

Launch Date	Name of Device	Initial Parameters of Orbit				Duration of ballistic existance in years (date funstioning ceased)	key
		Period of revolution in minutes	Maximum altitude, Km.	Minimum altitude, Km.	Inclination, degrees		
1	2	3	4	5	6	7	
5 January	«Метеор-2»	104.0	973	950	82.5	520	1
9 January	«Космос-1811»	89.7	367	181	64.9	(13/2/87)	2
14 January	«Космос-1812»	97.8	677	648	82.5	60	
15 January	«Космос-1813»	90.0	387	208	72.8	(29/1/87)	
16 January	«Прогресс-27»	88.9	280	189	51.6	(25/2/87)	3
21 January	«Космос-1814»	100.7	815	775	74.0	118	2
22 January	«Космос-1815»	93.5	558	345	50.7	3	
22 January	"Молния-3»	12 hr, 16 min.	40800	473	62.8	15	4
29 January	«Космос-1816»	104.9	1024	979	82.9	1200	2
30 January	«Космос-1817»	88.4	224	192	51.6	(13/2/87)	
2 February	«Космос-1818»	100.7	810	790	65.0	110	
6 February	«Союз ТМ-2»	88.7	247	197	51.6	(30/7/87)	5
7 February	«Космос-1819»	88.7	254	197	72.8	(18/2/87)	2
14 February	«Космос-1820»	88.8	273	186	64.8	(18/2/87)	
18 February	«Космос-1821»	105.0	1029	983	82.9	1200	
19 February	«Космос-1822»	89.5	332	205	73.0	(5/3/87)	
20 February	«Космос-1823»	116.0	1538	1497	73.6	(19/12/87)	
26 February	«Космос-1824»	89.7	370	177	67.2	(22/4/87)	
3 March	«Прогресс-28»	88.8	272	191	51.6	(28/3/87)	3
3 March	«Космос-1825»	97.7	677	649	82.5	(5/1/88)	10
11 March	«Космос-1826»	90.3	403	206	72.9	(25/3/87)	
13 March	«Космос-1827»	113.8	1434	1387	82.6	10,000	
13 March	«Космос-1828»	113.8	1435	1354	82.6	10,000	
13 March	«Космос-1829»	113.9	1437	1402	82.6	10,000	
13 March	«Космос-1830»	114.0	1437	1404	82.6	10,000	
13 March	«Космос-1831»	114.0	1440	1412	82.6	10,000	
13 March	«Космос-1832»	114.1	1443	1414	82.6	10,000	
18 March	«Космос-1833»	101.9	878	851	71.0	(23/3/87)	
19 March	«Радуга»	24hr 05min.	36,087	35,852	1.3	1,000,000	6
31 March	«Квант»	89.2	320	177	51.6	—	7
8 April	«Космос-1834»	92.8	443	413	65.0	2.8	2
9 April	«Космос-1835»	89.7	367	180	65.0	(3/6/87)	
16 April	«Космос-1836»	89.2	313	188	64.8	(2/12/87)	
21 April	«Прогресс-29»	88.7	257	194	51.6	(11/5/87)	3

Launch Date	Name of Device	Initial Parameters of Orbit				Duration of ballistic existance in years (date funstioning ceased)	key
		Period of revolution in minutes	Maximum altitude, Km.	Minimum altitude, Km.	Inclination, degrees		
22 April	«Космос-1837»	88.7	260	194	82.3	(28/4/87)	10
24 April	«Космос-1838»	5hr10m	17,452	211	64.9	(12/11/87)	
24 April	«Космос-1839»	5hr10m	17,429	209	64.9	(29/10/87)	
24 April	«Космос-1840»	5hr10m	17,530	209	64.9	(29/10/87)	
24 April	«Космос-1841»	90.5	403	225	62.8	(8/5/87)	
27 April	«Космос-1842»	97.8	678	648	82.5	60	
5 May	«Космос-1843»	89.5	312	214	70.4	(19/5/87)	
11 May	«Горизонт»	23hr 21m	35,174	35,024	0.9	1,000,000	8
13 May	«Космос-1844»	102.0	879	851	71.0	117	2
13 May	«Космос-1845"	90.4	400	217	70.0	(27/5/87)	
19 May	«Прогресс-30»	88.8	265	192	51.6	(19/7/87)	3
21 May	«Космос-1846»	89.2	314	196	82.4	(4/6/87)	2
26 May	«Космос-1847»	89.7	373	177	67.2	(22/7/87)	2
28 May	«Космос-1848»	90.2	400	208	72.9	(11/6/87)	
4 June	«Космос-1849»	11hr49m	39,342	613	62.9	15	
9 June	«Космос-1850»	100.8	825	785	74.0	(21/1/88)	
12 June	«Космос-1851»	11hr50m	39,402	592	62.8	14	
16 June	«Космос-1852»	114.5	1503	1400	74.0	9550	10
16 June	«Космос-1853»	114.7	1485	1396	74.0	9550	
16 June	«Космос-1854»	114.9	1484	1412	74.0	9550	
16 June	«Космос-1855»	115.0	1485	1425	74.0	9550	
16 June	«Космос-1856»	115.2	1484	1441	74.0	9550	
16 June	«Космос-1857»	115.4	1489	1457	74.0	9550	
16 June	«Космос-1858»	115.7	1521	1481	74.0	9550	
16 June	«Космос-1859»	115.7	1511	1481	74.0	9550	
19 June	«Космос-1860»	89.7	283	255	65.0	0.2	2
23 June	«Космос-1861»	105.0	1014	995	83.0	1220	
1 July	«Космос-1862»	97.7	679	645	82.5	60	
4 July	«Космос-1863»	90.8	383	208	72.9	(18/7/87)	
7 July	«Космос-1864»	104.8	1019	977	83.0	1215	
8 July	«Космос-1865»	89.5	327	204	64.8	(14/8/87)	
9 July	«Космос-1866»	89.8	386	177	67.2	(26/7/87)	
10 July	«Космос-1867»	100.8	813	797	65.0	108	
14 July	«Космос-1868»	94.5	726	279	74.0	1.0	
16 July	«Космос-1869»	97.8	679	647	82.5	60	
22 July	«Союз- ТМ-3»	88.6	236	200	51.6	(29/12/87)	5
25 July	«Космос-1870»	88.7	282	168	71.9	--	2
1 August	«Космос-1871»	88.3	212	191	97.0	(11/8/87)	
4 August	«Прогресс-31»	88.8	269	193	51.6	(23/9/87)	3
18 August	«Метеор-2»	104.1	974	954	82.5	520	1
19 August	«Космос-1872»	89.6	333	208	72.9	(30/8/87)	2
28 August	«Космос-1873»	88.8	274	186	64.8	(1/9/87)	
3 September	«Космос-1874»	89.6	333	208	72.9	(17/9/87)	

Launch Date	Name of Device	Initial Parameters of Orbit				Duration of ballistic existance in years (date funstioning ceased)	key
		Period of revolution in minutes	Maximum altitude, Km.	Minimum altitude, Km.	Inclination, degrees		
3 September	«Экран»	23hr43m	35,619	35,459	0.4	1,000,000	9
8 September	«Космос-1875»	113.8	1432	1389	82.6	10,000	10
8 September	«Космос-1876»	113.9	1434	1395	82.6	10,000	
8 September	«Космос-1877»	113.9	1436	1400	82.6	10,000	
8 September	«Космос-1878»	114.0	1436	1404	82.6	10,000	
8 September	«Космос-1879»	114.1	1439	1411	82.6	10,000	
8 September	«Космос-1880»	114.1	1441	1413	82.6	10,000	
11 September	«Космос-1881»	89.0	297	190	64.8	--	
15 September	«Космос-1882»	88.6	253	196	82.3	(6/10/87)	
16 September	«Космос-1883»	11hr16m	19,153	19,124	64.9	1,000,000	
16 September	«Космос-1884»	11hr16m	19,155	19,121	64.9	1,000,000	
16 September	«Космос-1885»	11hr16m	19,153	19,122	64.9	1,000,000	
17 September	«Космос-1886»	89.8	384	178	67.2	(2/11/87)	
24 September	«Прогресс-32»	88.8	268	193	51.6	(19/11/87)	3
29 September	«Космос-1887»	90.5	406	224	62.8	(12/10/87)	2
1 October	«Космос-1888»	24hr 3m	35,989	35,861	1.4	1,000,000	
9 October	«Космос-1889»	90.4	400	216	70.0	(23/10/87)	
11 October	«Космос-1890»	92.9	442	414	65.0	2.8	
14 October	«Космос-1891»	104.9	1030	957	82.9	1200	
20 October	«Космос-1892»	97.8	678	647	82.5	60	
22 October	«Космос-1893»	89.7	374	179	67.2	(15/12/87)	
28 October	«Космос-1894»	24hr 2m	35,918	35,729	1.3	1,000,000	
11 November	«Космос-1895»	90.4	402	217	70.4	(26/11/87)	
14 November	«Космос-1896»	89.4	319	203	64.8	(25/12/87)	
21 November	«Прогресс-33»	88.7	266	193	51.6	(19/12/87)	3
26 November	«Космос-1897»	23hr55m	35,825	35,727	1.4	1,000,000	2
1 December	«Космос-1898»	100.8	820	781	74.0	120	
7 December	«Космос-1899»	89.3	297	216	70.4	(21/12/87)	
10 December	«Радуга»	23hr16m	35,049	34,948	1.3	1,000,000	6
12 December	«Космос-1900»	89.8	287	263	65.0	0.5	2
14 December	«Космос-1901»	89.28	376	181	64.9	(3/2/88)	
15 December	«Космос-1902»	92.4	417	373	66.0	3	
21 December	«Союз ТМ-4»	88.6	250	170	51.6	--	5
22 December	«Космос-1903»	11hr49m	39,342	614	62.8	15	2
23 December	«Космос-1904»	104.9	1021	989	82.9	1200	
25 December	«Космос-1905»	89.3	298	216	70.4	(8/1/88)	
26 December	«Космос-1906»	88.8	274	190	82.6	(31/1/88)	
27 December	«Экран»	23hr51m	35,944	35,458	1.5	(12/1/88)	9
29 December	«Космос-1907»	90.2	398	208	72.9	(12/1/88)	2

Pentagon's Orbiting Arsenal: USA Seeks World Domination Through SDI

91440070n Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 4, Apr 88 (signed to press 5 Mar 88) pp 42-43

[Article by Lt Gen V. Ivanov under the "The Pentagon's Orbiting Arsenal" rubric: "Supremacy Through Space"; first paragraph is AVIATSIYA I KOSMONAVTIKA introduction]

[Text] A series of articles on the USA's military space resources edited by Lieutenant General V. Ivanov will be published under this rubric this year. The first of them is offered here to the reader.

The expansionist nature of modern American imperialism has deep ideological roots. And in all cases the military-political conceptions of attaining supremacy have been based on utilization of technical innovations and discoveries to create resources of armed conflict. Thus in the late 19th and early 20th centuries the ideological basis for increasing the USA's naval power was the conception of sea power, which itself was based on the historical experience of the "ruler of the seas"—the British Empire, on which the "sun never set." The central idea of this conception was the assertion that a need existed for the largest and most sophisticated fleet possible, and for creating naval bases outside the country from which to seize a position of domination in the world. It was precisely under the influence of the sea power conception that the pace of construction of warships for the U.S. Navy grew dramatically for the first time, and erection of bases in distant countries began.

The First World War revealed the significance and prospects of using aviation for successful combat activities. The theory of the "special significance" of air forces, and chiefly bomber aviation, was developed in the staffs of the bourgeois armies. For many years the course toward improving the armed forces foresaw intensive development of aviation. Hundreds of billions of dollars were spent on building and equipping airfields at all latitudes of the globe, and on creating a large and diverse fleet of warplanes and transporters.

The realities of the rocket and space age compelled the political, industrial and military circles of the USA to address the problems of militarizing space. The premise that supremacy in space had "decisive significance" to attaining global domination began to be formed in the spirit of former expansionist conceptions. The military-industrial complex, which envisioned a possibility for extracting colossal profits from the development and production of military space resources, played the main role in this. The view of space as a source of profits for militarized industry was confirmed by all subsequent development of events.

Every new American administration has tried to ensure priority financing of military space programs. Outlays on them have risen decisively throughout the entire history of the development of space, and today they exceed the budget of the National Aeronautics and Space Administration. The terrestrial infrastructure of military space systems was created and constantly improved over a number of years. It included proving grounds, launching pads, an extensive network of data receiving, processing and transmitting stations, orbit and spacecraft monitoring stations, and radar and optical stations detecting and tracking objects in space.

Purposeful development of the doctrine went on in the USA from the second half of the 1950s, when following a period of sharp rivalry the air force won the right to design the principal rocket and space systems and began defining the procedures of their use. The work on the first space projects was carried out on a tight schedule with the help of sizable human and material resources, and therefore questions concerned with theoretically justifying the combat use of the new equipment were extremely urgent. The basic concepts of American "space strategy," according to which the earth's atmosphere and space were defined as a theater of military activities of a new dimension, were formulated during this period.

This theory foresees including space equipment in the weapons arsenal and making active use of it as "an instrument of national power." As a result of implementing its space program, the State Department now possesses numerous orbiting space systems to support the activities of the armed services and expanding their possibilities. These activities include reconnaissance, communication, and navigation, topogeodetic and meteorological support.

The significance of space systems to the performance of these functions in support of combat activities on land, in the air and at sea is extremely great, and it continues to grow. For example the USA uses space reconnaissance to obtain information on the basing of strategic missiles, on the operational organization of theaters of military operations, and the locations, operating conditions and characteristics of military radio engineering resources. From the viewpoint of American theoreticians expansion of the potential theaters of military operations is causing further growth of the requirements on the volume and qualitative content of intelligence necessary for prompt reaction to changing events. A special directive signed by U.S. President R. Reagan stated the need for integrated use of space technology to carry out military missions, so as to achieve the maximum result on the basis of the cost-effect criterion.

Much significance is also attached to improving space communications for the armed forces. Their global nature is an important operational characteristic in regard to controlling troops located in different regions. The U.S. Defense Department is operating several satellite communication systems utilizing commercial and international satellite communication and data transmission channels.

Navigation and topogeodetic satellites help chart the courses of airplanes and ships of the U.S. Navy and raise the accuracy of rocket fire. Weather information is believed to be necessary as a means of raising the effectiveness of space reconnaissance systems, and for use in behalf of the armed forces in general.

It should be noted that available publications permit the conclusion that military space systems are being used intensively for direct support of combat activities (as was the case for example during American adventures in Vietnam and in the Anglo-Argentine conflict) and when tension increases in certain regions.

The experience of operating space systems in support of the armed forces was accounted for by military theoreticians when they drew up the final draft of the premises of the USA's military-space doctrine and its "space strategy." Basing itself on the concepts of the "space theater of military operations" and "space weapons," the Pentagon is now working out the details of so-called "space operations." What is inferred here is that space systems consisting of components based on the ground and in orbit and which can also participate in missions in ground and marine theaters of war will be used in such operations. According to a U.S. Air Force manual "space operations" are divided into auxiliary and strike operations. The latter can make use of manned and automatic vehicles, spacecraft, rockets, satellites and the latest offensive weapons launched into space.

Judging from foreign publications the list of auxiliary operations includes operating launch vehicles and launch equipment of proving grounds, launching satellites and controlling them in orbit, detecting space objects and tracking, identifying and cataloging them. It should be noted that the term "auxiliary" for such operations is extremely arbitrary: These may often become decisive operations. Thus information on the extensive network of resources for detecting and identifying objects in orbit, to include objects in stationary orbit, should be viewed as the basis for deploying offensive antisatellite weapons.

Much attention is being devoted to measures to protect military space systems. For this purpose an excess quantity of satellites of a particular type are launched into orbit, and methods to protect against electronic interference and depressurization and to maneuver space vehicles are being developed. Specific examples of work in this direction can be found in the new generation of DSTsS [not further identified] strategic communication satellites, the design of which foresees higher resistance to the destructive factors of nuclear bursts, and in a number of scientific research and experimental design projects aimed at integrating different commercial and military systems with the purpose of ensuring fulfillment of their functional purpose in different military-political conditions.

Of course, "strike" operations in space are the focus of the main attention in the plans for "space operations." Although specific models of space weapons have not yet been created, their development has been going on a long time, and in recent years it is being intensified. It is noted that the growing significance of combat activities in space may lead to creation of offensive space-to-space and space-to-ground weapon systems.

Offensive space weapons are developing on a wide front within the USA's Strategic Defense Initiative program. Combat resources of the first echelon include antimissile missiles carried by orbiting stations. The second echelon is made up of ground-based antimissile missiles capable of destroying the warheads of the enemy's intercontinental ballistic missiles and submarine-launched ballistic missiles beyond the atmosphere in the descending portion of their trajectory. There are plans for deploying a third echelon of ground-based antimissile missiles to destroy ballistic missile warheads in the dense layers of the atmosphere.

Use of space-based kinetic energy weapons presupposes launching battle platforms into low near-earth orbits lying in different planes. After information indicating that intercontinental ballistic missiles have been launched is received from a system of geostationary satellites, weapon control is transferred to operators. They must determine the specific targets for each platform. Combat control and fire control satellites as well as the corresponding communication channels would begin functioning in this period.

Platforms bearing antimissile missiles and receiving data directly from target tracking satellites will perform guidance and launching functions. Beacon signals from antimissile missiles will be transmitted to these same platforms to establish destruction of a target and allocate additional interceptors in the event that it is not destroyed. Ground command posts will also begin using a beacon signal for general assessment of the attacking side's losses. Obviously such antimissile missiles would have the capability for destroying satellites in near- earth orbits.

American specialists are looking at X-ray lasers and nuclear microwave weapons emitting intense electromagnetic pulses, which are being created in the SDI program, as space weapons as well. Such systems can also destroy the enemy's strategic missiles, their warheads and satellites, and incapacitate ground and naval control facilities and communications.

In addition the American ASAT antisatellite system, which is intended to destroy satellites in orbits of up to 1,000 km in altitude, are in the final stage of testing prior to adoption for operational use. Based on the use of the F-15 airplane and rockets carrying homing heads, this system can be deployed at any airfield at the USA's disposal, and consequently it can threaten satellites with practically any orbit inclinations. The possibility of

equipping Pershing-2 missiles with homing warheads to destroy satellites at altitudes up to 2,000 km is being discussed in the U.S. Air Force.

According to specialists "it would make no sense" for the USA to create antisatellite systems "unless it was planning to make a first strike, to begin a nuclear war." In other words the Pentagon would like to obtain the possibility for striking Soviet satellites in order to "blind" the other side, catch it unawares and weaken its capability for a retaliatory strike in the event of a nuclear attack.

Urged on by the specter of military superiority over the USSR, planning space operations and creating offensive space weapons, the American military department is bringing all things having to do with space together into a single "cosmic fist." Created 2 years ago, the U.S. Air Force's combined space command is endowed with extensive powers—from conducting theoretical research to planning and directly utilizing military space systems. As offensive space weapons are adopted, they will be transferred to the combined command, which is responsible for direct implementation of a highly dangerous principle: "He who controls space can control the entire world." American politicians clearly count on laying a road to military supremacy through space. Space is given the role of an "absolute position" which, if occupied firmly, could permit establishment of domination of the "chosen people" over the rest of the world—that is, attainment of that which could not be attained in the era of steamships, piston-engine airplanes, rocket technology and jet aviation. But American strategists can expect nothing along this road but more disappointments.

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Cosmonaut's Notes: Cosmonaut Lavaykin Relates Experiences Aboard Mir Complex

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No 4, Apr 88 (signed to press 5 Mar 88) pp 44-45

[Cosmonaut's Notes: Article by Hero of the Soviet Union A. Laveykin, USSR pilot- cosmonaut: "Putting Mir Together"]

[Text]

12 April 1987

It is customary for Cosmonautics Day to begin in orbit with visits with relatives and friends, and with viewing a special edition of the television journal "Man. Earth. Universe." We deviated from this tradition somewhat. As we joked later on, that day began with a meeting with humanoids. That was how our friends christened the unplanned extravehicular activity.

On 31 March a Proton launch vehicle carried the Kvant astrophysical module into orbit. In the night of 5 April, following far approach maneuvers, it came close to the station. And when there were but 200 meters left before contact, Kvant unexpectedly strayed beyond the station's visual field. Strange as it may seem at first glance, unusual caution and the desire to carry out the final phase as gently as possible were responsible for the fact that at a certain moment the module's control system, which was operating on the basis of a built-in algorithm, halted the approach process and initiated a withdrawal.

On 9 April, after appropriate corrections were made in the approach program, a second attempt was made to dock the module with the station.

It was 0500 hours. Contact, mechanical engagement of the vehicles. The gentle jolt accompanying this operation. We were about to celebrate when suddenly we heard the angry voice of V. Blagov, the assistant flight control officer:

"Hard docking has not occurred. Turn on the television camera for us while you look through the porthole to see if something is in the way of the module."

Yuriy crawled into the transfer chamber. During this time Flight Control Center repeated the retraction maneuver, but without success.

Through the porthole we noticed that the module was slightly out of alignment with the station, and that a thin cable dropping down the surface of the Kvant module to the docking unit was present at the point of misalignment. We reported this to Flight Control Center. Engineers on the ground modeled the situation. The cable, straps and other objects that may have gotten into the docking unit for one reason or another were identified among the probable causes. The modeling results confirmed the actual situation, but only an EVA could confirm any of the hypotheses.

Crews train ahead of time for all work in open space on the ground, in a swimming pool. We trained for such work as well: We practiced installing a supplementary solar battery, which was in the Kvant module at the moment. But it is hard to foresee everything in our work. Unforeseen situations and unplanned EVAs resulting from them had occurred before as well. Recall at least V. Lyakhov and V. Ryumin, who freed Salyut-6 from a 10-meter radio telescope antenna.

Even before instructions were transmitted from Flight Control Center, we knew that an EVA was unavoidable, and therefore we began preparing for it. We distributed our responsibilities in the following way. Yuriy had a perfect knowledge of the pressure suits, and he had accumulated considerable experience in working with them. And so he began preparing them. I began gathering the tools. This brought up the question as to what to take along. In the end I took a sack, filled it with anything that

might turn out to be useful in some way or another, and attached a few lengths of cord. Later on Flight Control Center offered some recommendations as well.

As a rule, several days are devoted to preparing the pressure suits. But we were in a hurry. The Kvant astrophysical module was carrying some very interesting scientific apparatus created by specialists from England, the FRG, Holland, Switzerland and the European Space Agency working together with Soviet scientists. They were naturally anxious, according to what we were told by journalists who attended a press conference on 6 April.

Over 60 persons convened at Flight Control Center that evening. Correspondents from central Soviet newspapers TASS, APN and Gosteleradio and representatives from foreign mass media accredited in Moscow attended. There were many questions, and they were quite diverse, beginning with the prospects for the development of cosmonautics and ending with my date of birth. But the first question they asked was why docking had not occurred. At the end of the conference the journalists congratulated us on the approaching holiday—Cosmonautics Day.

On the night of 12 April, at 2340 hours, we opened the hatch, and an hour later we were even with the docking assembly. A cursory glance refuted the suggestion that a cable was in the way of the docking unit. We communicated this to Flight Control Center. V. Ryumin replied that a command to extend the rods would be tranmitted within the zone of the station in Yevpatoriya. He asked us to be attentive and to inspect the condition of the straps.

The rod moved out 150 millimeters. I noticed some sort of foreign object resembling a sack in the light of my lantern. I asked them to move the rod out a little further. After this I forced my way into the cone of the station's docking unit and tried to pull this object out, but I could not. It was stuck so firmly that it could not be removed simply. It had to be torn into pieces, and the pieces had to be thrown away from the docking unit. Then we inspected the rings and straps and reported to earth that everything was completely in order.

At half past four we returned to the station and removed our pressure suits. During this time mechanical, electric, hydraulic and pneumatic connection of the vehicles was started by commands from earth. So it was that the first addition was made to the Mir station.

Learning the Unknown

In February 1987 astrophysicists recorded the flash of a supernova in the Large Magellanic Cloud. A shell impenetrable to roentgen rays formed around it after the explosion. We took the first photographs of this portion of the Universe in May using the Rentgen telescope. The results excited the scientists: They could see all stars but the supernova on the color photographs.

"Now it is important not to miss the moment," said USSR Academy of Sciences Corresponding Member R. Syunyayev at that time, "when the cloud disperses enough so that the star would appear once again in the photographs. But that's not all. Our international collective of researchers has prepared a list of heavenly bodies that need to be kept under observation. Kvant must work daily, around the clock."

This was the task posed before us by the astrophysicists. Just recently it had been clearly impossible. Judge for yourself. The six to eight Progress cargo craft that were sent to the Salyut station every year could supply it with only enough propellant to carry out maneuvers and to maintain the needed orientation for 30-40 days. What was needed was a cardinal solution to the principles of designing the control system, and chiefly the actuating mechanisms.

Generally speaking we did possess spacecraft orientation and stabilization systems that worked without consuming fuel. The Meteor satellites are an example. Their electromechanical flywheel system, which is powered by solar cells and storage batteries, keeps the vehicle operating permanently in orbit. An orientation system employing a spherical flywheel-motor resting on a magnetic suspension was used as an experiment aboard the stations Salyut-3 and Salyut-5. But the moments of inertia of Meteor and Salyut are significantly lower than that of the new complex.

At the time that the Mir complex was being planned, the collective of scientists under the leadership of USSR Academy of Sciences Corresponding Member B. Chertok proposed installing a new control system with no analogues in world practice aboard Kvant. It was based on the use of powered gyroscopes on a magnetic suspension (gyrodynes) as the actuating mechanisms. The rotor of such a gyroscope—a ferrite sphere—is kept suspended by a magnetic field. The needed characteristics of the field are automatically regulated by a special servo system. To reduce air friction the high-speed rotor is located in a housing isolated from the module's atmosphere and communicating directly with space. The kinetic moment generated by the rotor is commensurate with the kinetic moment of the orbiting complex. Therefore expensive fuel is not required to turn the station and to orient and stabilize it. Responding to a program run in a onboard digital computer, the actuating organs create a kinetic moment; exchanging this moment, the orbiting complex assumes its required position.

It would not be difficult to imagine how complex and important the task posed to the developers of this unique system was. Creation of the gyrodyne was preceded by mathematical modeling of the electromagnetic, dynamic and thermal processes. Then the designers and process engineers had to determine the material and configuration of the rotor that would allow it to withstand the required loads at the selected rotation rates. Concurrently the frequency characteristics of all six rotors of the gyrodynes installed in Kvant had to be made identical.

The task posed to the control experts was no less complex. Extremely intricate computer algorithms accounting for the controllability of the system at any orientations of the orbiting complex were written. Algorithms for restoring the dissipated kinetic moments of the gyrodynes without using fuel by means of gravitational moments were written as well. Ground tests and then tests in space confirmed the high precision of the complex's stabilization. It did not exceed one angular minute.

The scientific apparatus of Kvant was of a level of sophistication equal to that of the motion control system. The scientists had a good impression of what the work of the crew aboard the Mir complex would be like, and they knew quite well that the more automatic systems there were, the more experiments could be conducted at the same time. The Rentgen telescope is one such instrument. A command from earth was all that was necessary to run the program fed into the onboard digital computer; responding to this program, the motion control system orients the orbiting complex. Information on the object of investigation is also automatically transmitted via a radio channel.

In the course of an experiment the crew simply monitors the work of the automatic system, intervening in its operation when necessary. The fact is that the program introduced by Flight Control Center does have procedural and instrumental errors, and with time the control instruments do require some adjustments. Therefore a way to correct the station's orientation during work with the Rentgen telescope is foreseen. Our responsibilities were distributed as follows. Yuriy worked with the star tracker. He found the needed star and read its coordinates off of the instrument's information panel while I introduced these figures into the display. The inertial base-line was mathematically adjusted in this fashion. By doing so, and without interfering in the experiment itself, the crew was able to raise its reliability and accuracy to standard conditions.

Joys and Alarms

Training in emergency abandonment of the station is foreseen aboard. Such training was also conducted on earth, but in space, everything is much more serious. One must act quickly, decisively, and react to a situation literally with lightning speed. Why does Flight Control Center plan such training? It helps to persuade the center that we are ready to act properly, and it makes us confident of ourselves in such cases. And although some simulation is involved, we still do act in realistic fashion: We prepare the pressure suits, collect some of the instruments, onboard documents and scientific research materials, close the hatches and check the pressure—that is, we do everything necessary when abandoning the station. And all of this must be done in just a few minutes.

On hearing an alarm signal we must rush to the central console and find out what happened. Assume that the transparency "Smoke in Station" is on. Then we go to the fire warning console and see which of the sensors was activated. A flashing red light diode indicates the location of the fire. Next we need to open up the panel indicated by the sensor, make sure whether or not there is a fire, and report to earth. We conducted several such trainings. After each one, Flight Control Center critiqued it and scored our actions.

Now a few words about the joys we experienced in orbit. Step by step, day after day the possibilities of the orbiting complex expanded, and together with this, the amount of work we had to do grew. There was no real distribution of responsibilities in our work. There were two of us, and each had to back up or replace the other at any moment. I did work as a fitter, an electrician, an installer and a tester. The work a cosmonaut does when reoutfitting the station is similar to that of a working man, and we were proud of this. All work always brings joy. But in orbit, this feeling is even keener, because one knows that, as the song goes, "our marks [footprints]" will remain on the developing "Mir [World]."

Let's talk about songs. During the flight Yuriy composed a few very good space songs. The first was performed by us in a holiday broadcast of the television journal "Man. Earth. Universe." Here are the words:

Burning to ashes, the stages fall away, After imparting cosmic speed. Our turn has come, and now we'll measure Our love for you, beloved earth. I'm with a friend, reliable and tested, My guitar, and work without end. Our flight is measured in more than days, The whirlpool of work and stars will turn. And then I'll roll in the grass And breathe all the air I choose, I'll drink my fill from the river, when I return. I'll fall to the ground, Embrace my friends, I'll sing and love again, When I return.

Working like a healing elixir, songs relieved us of our psychological load.

The longer you work in space, the more you experience information starvation. Our flight coincided with expansion of glasnost, with the beginning of economic reforms in the country, and naturally we were interested in literally everything. Yuriy even said: "We can't return totally ignorant. Give us more news."

It must be said that our needs were understood by Flight Control Center, and the chief operator constantly prepared materials from the television programs "Ninety Minutes," "Before and After Midnight" and "Good Evening, Moscow!," and he read passages from the newspapers PRAVDA, ARGUMENTY I FAKTY and MOSKOVSKIYE NOVOSTI. In addition each evening he reported on our families: what our wives Natasha and Alevtina were doing, and what kind of grades our children, Kirill and Artem, were making. This happened at the end of the day, and it had a good effect on our mood. As if returning home, we relaxed, and let the day's cares fade away.

I felt good both physically and psychologically, but unfortunately the doctors discovered from objective parameters transmitted telemetrically to earth that changes had occurred in heart function. I was forced to return on 30 July together with a visiting expedition. The new parachute system of Soyuz TM-2 worked dependably. The impact with the ground was tangible, but nonetheless it was easy to endure. The first thing that struck me was the odors of the earth, which I had managed to forget over half a year. After all, the smells aboard the station are limited to those of the instruments, the equipment, rubber gaskets and special cleansing wipes.

At the end of the first day I took off my trousers and my Karkas pressure suit, on the next day I went walking and took a swim at the cosmodrome pool, and on the third day I felt as if I had never flown in space. I underwent an examination in the cardiological scientific center. It revealed that some changes had occurred in heart function, but they had not caused pathology. Today I feel very good, I have gone into training, and if the need arises, I am ready for a new flight into space.

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Articles in AVIATSIYA I KOSMONAVTIKA Not Translated

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